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ADVISORY GROUP FOR AEROSPACE RESEARCH & DEVELOPMENT

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Electronic Transfer of Information and its Impact on Aerospace and Defence Research and Development

NORTH ATLANTIC TREATY ORGANIZATION

DISTRIBUTION AND AVAILABILITY
ON BACK COVER

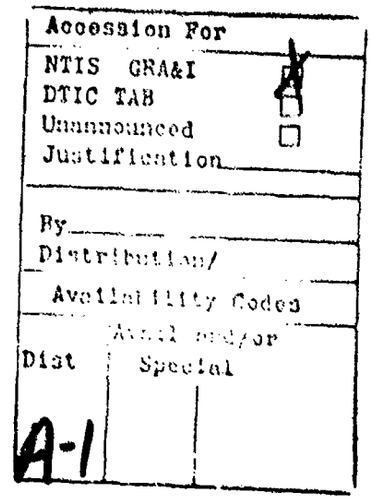
NORTH ATLANTIC TREATY ORGANIZATION

ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT

(ORGANISATION DU TRAITE DE L'ATLANTIQUE NORD)

AGARD Conference Proceedings No.466

ELECTRONIC TRANSFER OF INFORMATION AND ITS IMPACT ON AEROSPACE AND DEFENCE RESEARCH AND DEVELOPMENT



Copies of papers presented at the Technical Information Panel Specialists' Meeting, held at the Etat-Major Général, Brussels, Belgium, 17th—19th October 1989.

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According to its Charter, the mission of AGARD is to bring together the leading personalities of the NATO nations in the fields of science and technology relating to aerospace for the following purposes:

- Recommending effective ways for the member nations to use their research and development capabilities for the common benefit of the NATO community;
- Providing scientific and technical advice and assistance to the Military Committee in the field of aerospace research and development (with particular regard to its military application);
- Continuously stimulating advances in the aerospace sciences relevant to strengthening the common defence posture;
- Improving the co-operation among member nations in aerospace research and development;
- Exchange of scientific and technical information;
- Providing assistance to member nations for the purpose of increasing their scientific and technical potential;
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THEME

The technology for electronic transfer of information is développing rapidly; electronic publishing, electronic storage, processing and delivery of information including text and images are all operational or feasible. Innovations in telecommunication networks play an important role in the electronic transmission of information. Applications of advanced information technologies impact the production, transfer and use of scientific and technical information as well as the communication and working conditions in the international scientific community.

The programme first presented the state of the art and trends of information transfer technologies throughout the world. The next sessions stressed on-going experiments and operational systems in electronic storage and delivery of information, electronic publishing and communication. Finally, there was a forum discussion with invited statements from various R&D agencies to help assess applications in the aerospace R&D community.

* * *

La technologie du transfert de l'information est en plein essor; l'édition électronique, la mémoire électronique, le traitement et l'acheminement de l'information y compris texte et images sont tous déjà opérationnels ou réalisables. Les nouveautés dans le domaine des réseaux de télécommunications jouent un rôle important dans la transmission de l'information. Les applications de l'informatique de pointe ont un impact sur l'élaboration, le transfert et l'exploitation de l'information scientifique et technique, ainsi que sur la communication et les conditions de travail au sein de la communauté scientifique internationale.

Le programme a présenté en premier lieu l'état de l'art et les tendances actuelles des technologies de transfert de l'information dans le monde. Les sessions qui ont suivi ont porté principalement sur les experimentations en cours, les systèmes opérationnels de stockage et d'acheminement électroniques de données, l'edition électronique et les réseaux de télécommunications. Puis, le programme s'est terminé par une table ronde, avec des communiqués de diverses agences de recherche et développement, en vue d'évaluer les applications pour la communauté R&D aérospatiale.

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TECHNICAL EVALUATION REPORT

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SUMMARY

The report summarises 16 papers (including discussions) presented at the AGARD Technical Information Panel (TIP) Specialists' Meeting on "Electronic Transfer of Information and its Impact on Aerospace and Defence Research and Development" which was held from 17th—19th October 1989 in Brussels, Belgium; and comments on the state of the art of the technologies presented, discusses their possible introduction into scientific and technical organisations, and provides recommendations on the use of technologies with emphasis on the aerospace and defence community. The following topics were addressed: Technologies for electronic transfer of information, electronic storage and delivery, electronic publishing and communication, applications to the aerospace and defence R & D community.

1. INTRODUCTION

The AGARD Technical Information Panel (TIP) Specialists' Meeting on "Electronic Transfer of Information and its Impact on Aerospace and Defence Research and Development" was held (with 182 participants) from 17th—19th October 1989 in Brussels, Belgium. Its theme was defined as follows:

> "The technology for electronic transfer of information is developing rapidly; electronic publishing, electronic storage, processing and delivery of information including text and images are all operational or feasible. Innovations in telecommunication networks play an important role in the electronic transmission of information. Applications of advanced information technologies impact the production, transfer and use of scientific and technical information as well as the communication and working conditions in the international scientific community."

The meeting was broken down into 4 Sessions and a Forum Discussion:

Session I	— Technologies for Electronic Transfer of Information
Session II	— Electronic Storage and Delivery: On-going Experiments and Operational Systems
Session III	— Electronic Publishing and Communication: On-going Experiments and Operational Systems
Session IV	— Applications to the Aerospace and Defence R & D Community
Forum Discussion	

The Evaluation Report consists of two main parts, a descriptive and a reflective part. The descriptive part contains summaries of the 16 papers presented, the discussions on the papers, the forum discussion and some points made by participants in response to a questionaire. The descriptive part refrains as much as possible from comments by the rapporteur (the author of the Evaluation Report). Of course, summarizing means selecting items which the rapporteur believes are important. As a consequence, *indirect* comments cannot completely be avoided.

The reflective part contains the rapporteur's comments on the state of the art of the technologies presented, discusses their possible introduction into scientific and technical organisations, and provides recommendations on the use of technologies with emphasis on the aerospace and defence community. In contrast to the descriptive part, the reflective part expresses the personal opinion of the rapporteur.

2. SUMMARIES OF PAPERS AND DISCUSSIONS

Paper No. 1.

FMastroddi described the present state of electronic publishing in Europe and reports on several trends and actions in this field. The figures presented were derived from various reports and from the findings of the European Information Market Observatory, a panel of 500 observers (users and suppliers) set up by the Commission of the European Communities (CEC). The actions described are those which were or are being encouraged by the CEC. Information Technology: Partly owing to national (e.g. the Alvey Programme in the UK), intergovernmental (e.g. EUREKA) and European Community actions (e.g. ESPRIT, the European Strategic Programme for Research and development in Information Technology) European IT companies have significantly increased their own domestic market share from 33% in 1983 to 50% today. Further support (e.g. through ESPRIT II and EUREKA) for IT actions will be devoted to IT components, semiconductors and information processing systems.

Telecommunications

The European PTTs had revenues from public telecomms services of 53 billion ECU in 1987, and they invest 20 billion ECU annually. However, the US figures are twice as large and grow faster; e.g. the telecomms equipment market in Europe is

growing by less than 5% per year, compared with 8% in the USA. It is assumed that this discrepancy is partly due to the fragmentation of the European market which is intended to be overcome by the single market from 1992 on. In order to speed up the establishment of a single telecomms market the CEC pleads in favour of a liberalised regulatory environment ("Green Paper"), e.g. by means of Directives such as the one for the liberalisation of the supply of telecommunications equipment. Another measure is the stimulation of the construction, implementantion and use of advanced digital data networks and especially the coordination of the development of an ISDN infrastructure; the CEC recommends that the PTTs should plan their networks so as to provide 5 million ISDN subscriber lines by end 1992. Thirdly, the CEC encourages the development of IBC (Integrated Broadband Communications) with transmission rates of 0.5 to 2 Mbits/s as compared with 64 Kbits/s for ISDN. The implementation of IBC is planned to start in 1995. With its STAR Programme the CEC intends to ensure that no Member State will fall behind in the implementation and use of these new telecommunications.

Database development

A distinction is being made of

- online ASCII (bibliographic, numeric, factual, full text)
- online non-ASCII (videotex, teletext)
- local magnetic media (floppy disk, hard disk)
- local optical media (WORM, CD-ROM, videodisk, CD-I) and
- online optical media (image servers, remote jukeboxes).

There is already a substantial online market in Western Europe with a turnover of about 2 billion ECU, and it grows by approximately 20% per year. More than 80% of the turnover is generated by financial information services, notably Reuters. Of the worldwide 3240 online databases in 1987 only 27% originated in Europe, the bulk coming from the USA. In Europe 70% of the databases are funded by the public, in the USA only 25%.

As an example for the application of Digital Optical Disks (DOD) the TRANSDOC technology for storage of documents in facsimile form is mentioned. It is used e.g. by the European Patent Office and by the CNRS in Nancy (France) for many millions of pages. DOD systems are already linked to the telephone network for fax transmission and recently also to an ISDN network in France. For database publishing CD-ROM seems to have even better prospects than DOD. There are more than 300 commercial CD-ROM titles and 170,000 CD-ROM drives worldwide. The figures for Europe are 50 titles and 25,000 drives. In addition to full text, bibliographic/referral and numeric databases more and more mixed databases (text and graphics etc.) are put on CD-ROM. The role of in-house corporate publishing is likely to increase.

European Community initiatives in the information market

The IMPACT (Information Market Policy Actions) Programme of Directorate General XIII set up a European Market Observatory, overcomes technical, administrative and legal barriers to the flow of information, improves the synergy between public and private sectors, promotes the use of European information services, prepares actions in favour of libraries, and encourages pilot/demonstration projects in the following areas: Patent information, image banks, intelligent interfaces, tourism information, information on standards. An IMPACT II Programme is in preparation.

Discussion

The discussion revealed interest in the figures presented and their re-use (Yangz). Interested people and organisations are invited to request from DG XIII Technical Reports (4 so far) issued by the European Information Market Observatory which was set up by the CEC and consists of a network of about 500 observers.

A question on broadband communications (Molhoh) triggered the reply (Dunning) that there is a need for transmission rates of 2 Mbits/s which would require "backbone" transmission rates of 140 or even 540 Mbits/s. Each of the various potential user groups cannot afford to pay the rather high network costs alone. Discussions are under way between the CEC and the European Space Agence (ESA) on even higher transmission rates (Gigabits/s) which are also planned by the ARPA network in the USA for the end of the century. In the UK (Holmes) requirements for transmission rates of 2 Mbits/s are met by optical fibers which are already accessible at user premises e.g. in the London area.

Paper No. 2: 'The Present and Future in North America'

B.Unruh compared certain characteristics (economics, ease of distribution, market, and timing) of printing ("Gutenberg technology") with those of several new technologies: online, optical disks, knowledge software, videotex and gateways. The Information industry today is more driven by technology than by market forces. It is therefore important to look at the potential a technology has in meeting user requirements. In doing so, the young CD-ROM and gateway technologies seem to score better than the well established online technology. "Online systems and the products they offer, because of their high acceptance levels in certain communities and because of their failure to provide affordable services and easy-to-access systems, have been the impetus for the technologies that today are under development or being incorporated into the dissemination process". These technologies mainly aim at improving access to information: retrieval packages, knowledge software, faster telecommunications etc. They ought to address the end-user and not so much the skilled documentalist working in a library. Worth noticing is a trend towards clustering of information: Subject areas, such as medical or business information, and the corresponding databases (which should cover the subject area rather completely) are pre-selected so that marketing and user training can be focussed on better identifyable target groups of users thus allowing a better market penetration of the information products. Another interesting development is expected after the recent decision of the (often quoted) U.S. Federal Court Judge Harold Greene that the mighty AT&T is allowed, from 24 August 1989 on, to enter electronic publishing.

Discussion

On a question (Lawrence) whether AT&T will address the general consumer market place or the professional user community Unruh replied that if AT&T will be successful then for two reasons: choice of software for easy access to information and choice or production of databases which are of interest for the user.

On a question (Bullock) whether software for searching by end-users would be made available also to the scientific and technical community or whether ST laboratories would have to develop their own software the reply was that more and more software will be written "for you" than "by you", and the advice was given to keep close contact with software producers to make sure they will meet the user's requirements.

On a question on videotex (Chambaud) Unruh explained that in the USA videotex and gateways are used as near-synonyms, that Judge Greene was in favour of videotex after having seen a Minitel demonstration in France, however, that no videotex experiment in the USA has succeeded so far.

Dunning referred to the domestic (or consumer) market versus the professional market and wanted to know if there would be a future for service providers in addition to giants such as AT&T. Unruh felt that the potential unreached market is in the professional area because today's products have no appeal to domestic users, even if more artificial intelligence would be used. There is, of course, a big potential consumer market, but there is no product for it. A chance is seen for services which involve transactions (ticket ordering, home shopping etc.).

Paper No. 3. 'The Present State and Trends in Japan'

U.Wattenberg gave a full picture of electronic transfer of information in Japan. The huge number (6000) of Kanji characters caused many difficulties for the information industry: a Japanese-Japanese dictionary is needed for inputting characters via keyboard; the characters require high resolution screens etc. Having solved these problems Japan has turned such disadvantages into advantages: It is leading e.g. in the production of high resolution screens and fax machines. Together with China and Korea, Japan is establishing a 2-byte standard character set for up to 65000 characters. The Japan Information Center of Science and Technology (JICST) is one of the largest hosts and document supply centres in the world. The JICST file on science and technology e.g. grows by 700 000 documents per year, and the number of documents copied per year is 700 000 too. 100 000 documents per year are translated into English; machine translation systems are applied mainly for translations from English into Japanese. JICST hosts one of the STN nodes (Columbus, Karlsruhe, Tokyo) through which the JICST databases are worldwide accessible, those in English really, and those in Japanese "in principle". Of high importance are also the activities of the Japan Patent Information Organization (JAPIO) which cooperates with the US Patent and Trade Mark Office and the European Patent Office e.g. in establishing a worldwide image file of all patents since 1920. Instead of the traditional 16 mm microfilm and microfiche the JAPIO now distributes to its subscribers 12 cm CD-ROM including full text images and index data. There is a sophisticated retrieval system for trade marks. And patents can be applied now either online, or on floppy disk, or in printed form. Japanese newspaper companies now hold their journals in electronic form. There is a database with 500 000 photos on CD-ROM. Each day 500 new photos enter the database. Nippon Telegraph and Telephone Corporation (NTT) has not been split up and is, therefore, very powerful, in spite of some competition from other organizations. ISDN (64 Kbit x 2 channel) started last year; this year a 64 Kbit x 23 system has been added, enabling 1.5 Mbit picture transmission. Experiences with videotex ("Captain") were disappointing. The paper contains a wealth of detailed information including contact addresses.

Discussion

Japan seems to be very successful in many respects including database generation; but what about retrieval? (Lawrence).

Japan is excellent in hardware and must catch up in software. JICST provides multi-database searching; the trend is towards "one-button" searches, in particular for SDI.

Is Group 4 facsimile transmission widespread? Is ISDN generally available? What is done for transforming text images into character codes? (Dunning).

Group 4 facsimile transmission (1 second per page) requires special lines (the normal telephone network not being sufficient); these exist between premises of big companies and are used for Group 4 fax. For general use ISDN is needed which starts just now in Japan. There are optical character readers for Japanese texts, but re-typing is still cheaper.

Questions on the information flow from and to Japan (Chambaud, Yanez, Vanautryve) yielded the following reply:

Japan is with 10% the third largest producer of scientific and technical information (after the US and the UK), however, there are only a few users of information in Japanese outside Japan. The situation is better for the subset of information translated into English by Japanese translators. Japan puts much effort in making their information available to the West. The West should put more effort than now into helping Japan in selecting information for translation and into using Japanese information. A comment from the floor (Lawrence) confirmed that there is virtually no use of Japanese databases in the USA.

Paper No. 4. 'Innovations in Telecommunications Networks'

C.Holmes of British Telecom (BT) reported on innovations in telecommunication networks. With regard to telecomms BT is a user, a vendor of networks and components, a systems integrator, a conformance tester, and a standard maker. Of main interest to the STI community are, of course, the services provided by BT. In this respect BT decided (1) to run its telephone services properly, (2) to go into new services such as value added networks, mobile communications ("cellular radio") for even the transmission of images, and (3) to go international. With deregulation in the UK, competition in the value added services marketplace, and the advent of the single European market in 1992 BT has reacted: The UK market alone is not viable for certain services; a pan-European market is aimed at. The Dialcom Public Services are available already in 23 countries and with 400,000 users; Tymnet will be added. Applications of the X.400 protocol are being developed: Electronic Data Interchange

(EDIfact for international fund transfers), Office Document Architecture (ODA), formatted messaging activities and user interface architectures. X.25 PSPDN commenced operation 8 years ago and has links to 100 other networks in 80 countries. BT offers an OSI infrastructure Local Area Network (LAN) and commenced an ISDN trial in Spring 1985. "The agreement of the European standard for ISDN later this year will provide a sound basis for investment for both PTT and multinational users alike". More and more telecomms developments are user driven.

Discussion:

Which mechanisms are used and should be used to put pressure on PTTs to react to requirements of users of scientific and technical information? (Lawrence).

Such requirements ought to be focussed.

How will optical fibers be brought to the workplace? (Molholm).

At present fibers are brought "to the door" not to the workplace. For buildings this would mean that the vertical infrastructure would be made with fibers and the horizontal distribution with copper wires. In new buildings plastic tubes should be installed in walls through which bundles of unshielded optical fibers could be blown when needed. Very soon fibers should go on to the desk.

Paper No. 5. 'Megatrends'

S.Chambaud had the courage to predict the future of electronic information transfer in form of 5 "megatrends":

1. Internal information originated in an organization will be merged with external information available from commercial services. This process will be facilitated by technologies such as desk top publishing (internal information), ISDN (external information), CD-ROM (storage of both types of information), and hypertext (user-friendly access to information) and could result in, what could be called, an "information machine" accessible even for the famous end-user.

2. More value will be added to information. There is progress from straightforward ("one-dimensional") text to multidimensional information including graphics, audio and moving images.

3. There will be vertical integration of documentary functions, such as bibliographic searches, localization, ordering and delivery of full textdocuments (e.g. to the local laser printer); and one might add ordering and delivery of automatic (raw) translations.

4. Commercial actors will integrate vertically and horizontally. These actors are the publishers, the database producers, the service providers, the intermediaries or information brokers, and the users. There are many examples of publishers and new actors in the information services market buying database producers and service providers (vertical integration); and there are horizontal acquisitions aiming at scale of economy and reduced competition. These developments will continue.

5. Systems will become more intelligent. This depends on research with new computer systems imitating functions of the brain one can expect natural language understanding, automatic translations, intelligent character reading (ICR), speach synthesis etc.

From these 5 megatrends one can derive 2 hypertrends. There will be more integrated, intelligent and user-friendly information services, and there will be a viable information industry.

Discussion

Is there a tendency also to integrate the production of documents into the chain of documentary functions? (Beauvais)

Yes, the increased use of the Standard Generalized Markup Language (SGML) by authors and editors can serve as an example.

If one uses machine translation as an example for intelligent systems, then there was not much development over the last 20 years. How soon will intelligent machine translations be available? (Wattenberg)

We will have to wait for the new generation of computers. A comment from Yanez pointed to the fact that one already now speaks of a language industry and that results from more mature automatic translation systems such as Eurotra can be expected soon

Paper No. 6. 'Optical Disc Systems'

A de Ridder gave an animating description of three types of optical disc systems: ROM, WORM and Reversible all of which are complementary and fit in a range of applications.

ROM (read only memory)

- C — audio, 12 cm, 74 min hifi
- CD — video, 12 cm, 5 min video (clip) + 20 min audio, hifi TV
- LV — Laser Vision, 33 cm, 154,000 still frames, 90 min video + audio
- CD — ROM, 12 cm, 154 Mbyte, MSDOS etc., text + bit map pictures

CD – ROM-XA, 12 cm, 654 Mbyte, text, audio, still + moving pictures
CD – I, 12 cm, real time oper. system, text + audio + still + moving pictures

WORM (write once read many)
5¼" WORM, 800 Mbyte
12" WORM, 2 Gigabyte

Reversible (under development), erasing and writing in one step,
could, when available, replace hard disc in PC.

The CD-ROM drive is more expensive than the CD-audio drive because it uses a more reliable (and expensive) motor. After error detection and correction the error rate is 10^{-10} compared with 10^{-3} for consumer audio. 275,000 pages (in character mode) can be stored on a CD-ROM. Program, index and information can be stored on the same disc.

Discussion

Is multiple access to CD-ROM possible? (Brendreth).

It is indeed. Many PCs can be linked to many CD-ROM drives, e.g. in a UNIX environment, allowing multiple users to access multiple databases.

The response time for CD-ROM is shorter than for online.

How does copyright effect the use of CD-ROMs? (Stolk).

One can arrange that a program copied from a CD-ROM can be used only when disk drive and CD-ROM are accessible.

Paper No. 7. 'Document Delivery via ISDN or Satellite Networks'

A.Dunning began his presentation on document delivery via ISDN or satellite networks with some fundamental considerations on the characteristics of document., document delivery systems, archives and document receiving terminals. Taking into account the various forms in which a document can be stored today, a document is defined as "a structured data set of which there is a lasting independent record for the purpose of transferring information or knowledge between human beings". A document delivery system comprises three components: a document store or archive, a means of delivery, i.e. a telecomms system, and a receiving station. Archives range from group 3 telecopiers to powerful PCs with at least 1 Mbyte RAM and a 20 MHz Intel 80386 or Motorola 68020, or better a 25–30 MHz 80386 or 68030 and 8 Mbyte RAM. A scanner and a printer are needed with selectable resolution (200, 300 and 400 pixels per inch) and one or more communications modules. Adequate software for the handling of requests and deliveries is not yet available. The receiving station would have to have characteristics which match the characteristics of the archive and a memory buffer. For electronic document delivery there are the telex, public switched telephone, circuit switched data, packet switched data, integrated services digital, and the satellite networks. Two main ISDN user-network access capabilities will be offered: basic access with 144 Kbits sec and primary access with 1544 Kbits sec in North America or with 2048 Kbits sec in Europe. ISDN is closer than many users expect; and information and communication managers should now plan to use it. ISDN standards are well underway. The advantages of satellites for telecomms services are: some are already in orbit and operational, they have a wide geographical coverage, they can be used in broadcast and multicast mode of use; they suggest distance independent tariffs; and they permit high data rates (>2 Mbits sec). The APOLLO (Article Procurement On Line with Local Ordering) system is a "multi-hub unidirectional microterminal system" (several transmit and many receive only stations). It is designed to use the Satellite Multiservice System (SMS) Transponders of EUTELSAT 1 satellites with a user data transmission rate of 1.5,36 Mbits sec. On the assumption that a 300 pixels per inch A4 page, compressed according to the modified READ algorithm (group 4 facsimile), contains about 1 million bits, approximately 90 pages per minute could be transmitted over the satellite channel. The microterminals will cost between $1 000 and $10 000. The price per page for the enduser will be in the order of $1.

Discussion

The Canada Institute for Scientific and Technical Information provides a rather large document delivery service (about 1/10 of the British Library's document supply service); with the costs for journal subscriptions going up Brendreth is absolutely sure that people will pay $1 or even $2–3 per page for fast document delivery; they already now pay a surcharge of $10 per document (about $1 per page) for delivery by telefax.

How can APOLLO services be integrated with existing facilities? (Lhulker).

Through an X.25 port connected to an APOLLO data station controller.

APOLLO offers the opportunity for multiple distribution of documents. Has the CEC considered the copyright problems which could arise? (Lawrence).

The CEC has recently issued a report with proposals on copyright. The unit dealing with these questions is aware also of the implications caused by new technologies.

Are there people in the audience who could report on experience with APOLLO? (Searle).

The Fachinformationszentrum Karlsruhe together with the German Patent Office and the Technische Informations-Bibliothek in Hanover was interested in APOLLO but is now looking ahead to use the forthcoming ISDN for document delivery. (Tittbach). The British Library Document Supply Centre was and possibly still is keen to pursue APOLLO (Dunning).

Are there similar plans in the United States? (Tittlbach).

In Japan there are plans to use TV satellite channels over night for document delivery. (Wattenberg).

The Wall Street Journal is using satellites for printing on both sides of the USA, and the Financial Times uses satellites for printing in Germany. There is a new generation of satellites with much more power which will permit the use of small receive stations perhaps even for data transmission to portable computers. (Dunning).

Paper No. 8. 'The Weapons Laboratory Technical Library — Automating with "STILAS"

B.Newton described STILAS, the Scientific and Technical Information Library Automated System operated by the United States Air Force Weapons Laboratory Technical Library. STILAS provides, in addition to the traditional library functions of circulation, serials control, acquisitions, and inventory control, the features of an integrated library system with gateway reference access to up to four remote databases simultaneously. STILAS runs on the UNIX 5.3 operating system implemented on a UNISYS 5000/95 supermini computer to which 16 workstations are linked. The retrieval software (in C) is based on the BRS/Search system. A comprehensive training package is available. The system permits endusers to search across a spectrum of remote databases while simultaneously searching local library files. For searching in up to four systems simultaneously the same command language is used; each search statement must be formulated only once; STILAS will translate it into the appropriate forms for each database being searched. There are 700 personal computers in the Weapons Laboratory outside the Library. Their users will be able to connect to remote databases through the STILAS host via a Local Area Network (LAN).

Discussion

A question on extra staffing required and another one on backfiling (Andrews) prompted the reply that all additional work had to be done by the Library's own permanent staff of 12 (and some co-op students) and that backfiling is aimed at covering the last five years.

The Redstone Scientific Information Center is going to use STILAS, which is felt to be a very good system, for their rather large collection of 3 million items; it is anticipated to extra employ a system administrator and an automation technician for this purpose; in the end STILAS will make savings (Bullock).

Staff resources becoming available due to avoiding duplicate cataloguing could be used for serving customers (7000 in the Air Force Weapons Laboratory) better than now (Newton).

A question on collective cataloguing (Yanez) prompted the reply that it is of advantage if specialised centers spread over the country would catalogue, abstract and index the material they know best and then exchange their products with the other centers.

Are there already end-users of STILAS, and what is done for training them? (Searle).

Many of the potential end-users of Weapons Laboratory are computer literate; to alert them to use STILAS orientation programmes with videocassettes and training packages are being prepared.

Should STILAS not be recommended for general use by NATO organisations? (Tittlbach).

STILAS could fulfill the required functions, however, people are needed to run such systems; and there is no commitment from the NATO headquarters to make the managerial staff, the technical staff and the information specialists available. (Molholm).

Paper No. 9. 'The Automation Plan of DC1 (Search) of the European Patent Office'

R.Bare reported on the Automation Plan of the Directorate General I (Search) of the European Patent Office (EPO) according to which 300 million DM will be spent over 8 years. The 500 examiners of the EPO need to have access to more than 20 million documents with an annual increase of 700,000 new documents, most of them patent literature, but also journal articles etc. There is also a need for searching tools using keywords or full text techniques that complement the use of the International Patent Classification (IPC) for searching. As a consequence three lines of action will be pursued: processing of textual information, processing of images, and personal systems. The main system for textual information is EPOQUE, an internal host computer loaded with internal (FAMily, INVEntory, Classification) and extensively used external databases (DERWENT, INPADOC). EPOQUE permits, with one and the same query language, crossfile searching (among different hosts), cluster searching, online help, thesaurus management, search strategy saves, and downloading to personal files. It will require a mainframe power of 30 Mips and a disk capacity of 60 Gbytes to serve up to 500 users simultaneously. With regard to the processing of images, in the framework of the BACON project 125 million of pages of patent documents are being captured (in form of images) and stored on optical disks. 65 million pages are being processed by EPO, the rest by the US Patent and Trademark Office and the Japanese Patent Office in the framework of a trilateral agreement. The examiners will maintain on their PCs personal files with material downloaded from various sources and used as a starting point in patent examination. The expected benefits of automation will be gain in productivity, an increased quality of searching, and a higher motivation of people.

Discussion

Relevant documents could be missed in searching, possibly due to inadequate indexing, thus causing problems with patent infringement litigation. Which level of indexing is applied in order to avoid such problems? (Searle).

All documents entering the EPO are re-classified by specialists thus reducing the danger of by-passing a document to a minimum. Nevertheless, as on average 1300 documents have to be consulted per working day, there is the possibility of

overlooking a relevant document. In any case it is ruled that "the EPO cannot be held responsible".

There are at least 100 database management systems with quite similar functions. Are we not reinventing the wheel with systems such as EPOQUE? (Dunning).

Each user has specific requirements When EPO called for proposals, none of the 8 bidders had the required software on the shelf; it had to be developed (by a consortium consisting of SARIN, Telesystemes and EPS) for 20 million DM. In a comment Molholm agreed with Dunning that there is a general problem with a multitude of similar systems. He felt that the functions should be broken up into at least three different parts: the ability to connect and to develop protocols; to know with which systems to connect; and what to do with the information in the environment into which it is delivered. Part of the problem could be solved by "intelligent gateway systems".

Tittlbach pointed to the novelty of EPOQUE of integrating access to external, internal and personal information and felt that many organizations could learn from it. He asked Bare to report on the policy of EPO on the provision of patent information to users outside the EPO. EPO's policy in this respect has been formulated in December 1988 by EPO's Administrative Council: The EPO is a producer of information, and the task of dissimination is left to the National Patent Offices (NPO) of the Member States of the European Patent Organisation. In case the NPOs will not dissiminate the information it can be made available to European information providers under conditions which would result in fair competion with existing information providers.

Paper No. 10. 'Desk-Top Publishing – What you need to know'

M.Taylor gave a comprehensive view on desk top publishing (DTP). DTP is the way many people can use some of the 'traditional' publishing skills. DTP can cope with different types of input (text, images etc.), is easier to read, more authoritive, more effective in communicating, uses less paper, and facilitates multiple and multimedia output. When the documentation of a device (e g. an aircraft) outweighs the device itself and when the documentation needs frequent updating then DTP can save much money. The minimum requirements for DTP are a PC, a screen to show input or output, a printer (preferably a laser printer) to print the output, a keyboard, a mouse and some DTP software. In addition to creating pages the software should support document retrieval, document management, revision control, revision tracking, distribution, and distribution control. The system should accept texts from other devices such as networks, should permit optical as well as intelligent character reading, should accept images such as line drawings and photographs, and should permit the creation of graphics. Publishing standards and architectures such as the Standard Generalised Markup Language (SGML) and the Office Document Architecture (ODA) play an increasing role in DTP.

Discussion

How to convince management that a DTP system should be acquired? (Correia).

The first point would be to improve the documents to be published, the second would be cost savings; for several applications also the time factor is of importance (there are cases where the documentation was out of date when the hardware was shipped).

There are scientists using DTP as authors and also as editors of their own products. Do we want such a development? Would we not loose something? And what are the prospects of colour prints created by DTP? (Dimond).

Certainly technology should not dictate whether authors become their own editors; it should depend on the author's organisation. Organisations can demand their authors to adhere to certain rules such as SGML. DTP offers flexibility. For example speed of publishing can considerably be increased with DTP; e.g. the changes a technician makes in a technical drawing can instantly be made seen on the other side of the Atlantic. And a large set of heavy manuals can be replaced by a CD-ROM which then easily can be mailed. With regard to colour, the technology is available, however, the costs of using colour in DTP are still very high

There are several examples of misuse of DTP (red letters printed on yellow paper, strange page numbering systems etc.) (Hart). Training in using DTP is absolutely necessary, in particular with regard to basic layout, use of typography, and mouse control.

Paper No. 11. 'Electronic Publishing with SGML'

M.Krüger described electronic publishing with the Standard Generalized Markup Language (SGML). SGML is a language which permits the description of the structure of a document; i.e. of the presentation of elements of documents. The elements could be texts, images etc.; the presentation refers to the location of the elements, to typography etc. If authors could be induced to apply SGML the publishing process could considerably be facilitated and speeded up. This happened already in certain environments: The US Department of Defense (DoD) established a plan to acquire, process and use logistic technical information in digital form and decided to apply the plan. This initiative is known under the name CALS (Computer-aided Acquisition and Logistics Support). It includes the application of SGML. DoD's suppliers of hard and software such as weapon systems are bound to deliver the accompanying information (documentation) in CALS format. This led, after a time of stagnation, to a more general acceptance and application of SGML. Defense departments in other countries seem to follow the DoD example. Also commercial publishers (Elsevier and Springer with 250 journal titles each) are using SGML.

Discussion

If authors are not using SGML could SGML be fed into the process later? (Lawrence).

No, the structure (SGML) must come first, before authors put information on paper or other media.

In order to take on board SGML, does a Ministry (or other organisation) have to have a policy to begin with? (Andrews).

Yes, CALS provides a good example.

How could we apply SGML to AGARD publications such as conference reports with up to 40 authors from quite different types of organisations? (Hart).

On the advice (Krueger) to have the AGARD proceedings published by a commercial publisher, Hart replied that this was tried and then turned down by national delegates; in the trial the publisher typeset the material; as a consequence the authors had to proof-read their documents again.

What is the relationship between SGML and the forthcoming ODA (Office Document Architecture) standard? (Holmes).

ODA is not directly related to publishing, even if a manuscript prepared according to ODA can be published. SGML is a language with which quite different items or events such as documents, a breakfeast and a dancing performance can be described. It is not competing with ODA, it can be interfaced with ODA.

Paper No. 12. 'Electronic Mail Systems'

In his paper on Electronic Mail Systems B. MAHON defined the most basic level of E-mail as a service providing a capability to write text messages into a system for delivery to other users in the same system. To this editing capabilities can be added and the possibility of distribution to a multitude of receivers. One of the principal difficulties with any messaging system is ensuring that it is used. There are various techniques to overcome these difficulties, however, none can guarantee usage. Personal computers which are more and more used for word processing can be linked for the exchange of texts. This type of E-mail depends on the interoperability between PCs and networks. The new CCITT/ISO standard X.400 will facilitate the interaction between previously incompatible electronic messaging systems. In a future scenario an electronic mail server (computer and software) which is available through the telecommunications can provide the following functions: message sending and receiving, telex sending and receiving, fax sending for all and receiving for some specially equipped devices, and voice messaging for all. All this is technically possible today but not yet as easy to use as today's methods and, therefore, not yet generally acceptable. Augmentation with ergonomic and functional features is required in order to overcome practices such as sending faxes after they have been created in word processors, printed and then fed into the fax machine.

Discussion

Molholm decided for his environment not to use E-mail now and for a while for two reasons: the necessary PCs with modems are not available to all associates and the discipline to really use the system could not be imposed. For the time being telefax was chosen instead.

Fax has generally been chosen as it is convenient; even texts produced with a PC can directly be fed into a fax machine. Could E-mail successfully be applied in conferencing systems? (Wattenberg).

There is only an artificial separation between E-mail and computer conferencing; and there are many examples for successful applications of these systems, often between different sites of the same organization. A problem with E-mail is that many potential users are not prepared to touch a keyboard. (Molholm).

Paper No. 13. 'Computer Conferencing'

In his paper J.Black described computer conferencing as an effective means of group communication without the limitations posed by real-time interactions (e.g. audio and video teleconferences) or physical location (e.g. face-to-face 'traditional' meetings). Computer conferencing permits "sharing the collective memory of a discussion between two, two hundred or two thousand participants who may be scattered around the globe. ... Participants can join a computer conference at their own convenience (in terms of time of day and physical location), read what has already transpired in the meeting, add their 'voice' to the discussion or contribute new thoughts and then exit from the 'conference' to return at another convenient time." A wide range of possible and actual applications is listed which could have and partially has been listed already by B. Mahon in his presentation on electronic mail services, thus underlining the similarity of E-mail and computer conferencing. However, there are also differences between both these techniques: computer conferencing normally requires a moderator who must stimulate and guide the discussion. The paper was not presented by John Black but by his collaborator, Ellen M. PEARSON. She pointed to certain characteristics of computer conferencing such as chronological storage (who said what and when?), logical relationships of text (linking blocks of contributions by subject, in order to follow the train of thoughts). That participants from various language groups may find written text easier to understand than spoken words is seen as one of the many advantages of computer conferencing. Pearson gave a number of examples of applications of computer conferencing and concluded with J. Black's words that "it is a 'natural' for use by AGARD."

Discussion

If one starts with E-mail, is then additional software required for switching to computer conferencing? (Wattenberg).

Additional software is needed in particular for the chronological storage and retrieval of conference contributions and for the logical relationship of texts and their retrieval by means of free text searching.

Do you have particular examples of the use of computer conferencing in project management scenarios? (Hall).

The answer was "No".

In one of the examples computer conferencing was used as a teaching tool. Can it really replace face-to-face communication? (Andrews).

It is not a complete substitute for human interaction; it is an additional tool which saves some of the teacher's time.

British Telecom applies an electronic publishing package (which includes searching capabilities) on top of their electronic mail system and thus achieve computer conferencing. (Holmes).

You mentioned multilingual computer conferences. Do you apply automatic translation facilities for this purpose? (Chevalier).

"I only referred to various language and cultural groups which may find written text easier to understand than spoken words and that computer conferencing gives them the time for thinking and formulating their reply." There are systems for automatic translation (French to English translation was demonstrated last fall in Greece) which could be integrated into computer conferencing in a not too distant future. (Molholm).

A bit out of context the question was discussed if a signature on a document was legal when the faxed document was used as a proof.

Paper No. 14. 'The DOD "CALS" Initiative'

K.Molholm reported on the Computer-aided Acquisition and Logistics Support (CALS) initiative of the US Department of Defense (DoD). CALS "is directed toward improving the design, development, and support of weapons systems through the use of current and emerging computer technology," and aiming at the use of "electronic transfer of information to the maximum amount possible". The CALS initiative is a "strategy designed to create a system that can create, transform, store, reproduce, change, distribute, and use information as it evolves through the design, manufacture, maintenance, and logistics support of Defense weapons systems and equipment". In this initiative also the weapons manufacturing industries as suppliers of DoD are involved. DoD will not contract with suppliers who are unwilling to do business (e.g. submit engineering drawings, blueprints) in a paperless mode. The basic objectives of CALS are: reduced acquisition and support costs; improved quality and timeliness of technical information; and improved responsiveness of industry. As an example for cost savings it was mentioned that the US Air Force will save $135 million annually just in the cost of updating manuals. Use will be made of CALS by the various military communities responsible for standardization, system design and development, maintenance, and logistics. Since many CALS standards have or will become US Federal Information Processing Standards (FIPS) they will also be used by other US Government agencies. Even other NATO member nations might adopt CALS. CALS is accelerating the acceptance and work on several emerging text and graphical standards, including the CCITT Group 4 raster image specifications, the Standard Generalized Markup Language (SGML) for texts and the Initial Graphics Exchange Standard (IGES) for drawings.

This paper was discussed at the Forum Discussion.

Paper No. 15. 'Transfert Electronique de l'Informaton: Applications dans la Société, "Aerospatiale"'

O.Lavroff described the applications of electronic information transfer in Aerospatiale, a French company with 33,000 employees, a turnover of 28 billion French Francs, and involved in the production of Concorde, Airbus and Ariane. A number of electronic information projects is being studied or implemented: a bibliographic database in the field of technics for internal (knowhow of company) and external (patents etc.) information which should obviate intermediaries; a database on macroeconomics; a database on internal and external standards; a database on multilingual terminology, stored on CD-ROM, as an aid for translation; technical documentation, stored on optical media, for use by the clients, in particular a maintenance information planning system; computer assisted aircraft trouble shooting; an aircraft documentation retrieval system (more than 200,000 pages text and images); an advanced project for European information exchange on technical documentation; and a system for automated online order processing, e.g. for ordering spare parts. With 70% of the production being exported, automatic translation of technical documentation is of utmost importance.

This paper was discussed at the Forum Discussion.

Paper No. 16. 'Information Technology Applications: a British Aerospace Military Aircraft Ltd. View'

K.Hall reported on information technology applications in the company British Aerospace Military Aircraft Ltd. with 131,000 employees and an annual turnover of several billion Pounds Sterling. The company is guided by three main principles:

(1) a capability to design, develop, make and market complete vehicles and systems must be maintained;

(2) a technical competitive edge must be sustained; and

(3) there must be continuing effort to reduce unit costs.

In order to achieve these goals information technology is extensively applied. "A company's success in the future will be linked closely to its success in the exploitation of information technology and in particular data." As a key system in the company's overall business architecture PROMIS is used which stands for PROject Management Integrated System. It permits active management control and feedback capability as well as the ability to produce credible executive management reports. A noteworthy policy was applied in using PROMIS: "Users must be discouraged from becoming 'experts' in the system or its language, but encouraged to use the system as a tool for managing projects". PROMIS handles data, tables, drawings, barcharts, critical path networks, milestone achievements, budget spending reports, resource histograms, cost/achievement reports and graphs etc.; it is coded in the Metier Management Systems Artemis language and runs in an IBM mainframe environment; access by PC will be added. "A most useful feature of PROMIS is the ability to predict outturn of a project and impact on expected milestones and end dates. This feature assumes more significance in the modelling role ('what if?'), during which a copy of the master data is used and modified to analyse a particular set of circumstances (sudden reduction of resources, change

of work content etc.)". "The introduction of such a comprehensive system represents something of a cultural shock to an organisation,". However, "the benefits derived are numerous".

This paper was discussed at the Forum Discussion.

Forum Discussion.

Impact of CALS

What impact will CALS have on the data distribution of the Defense Technical Information Center (DTIC)? And will CALS impact on technical base reporting?

There will be no direct impact; only those parts which are standards, like SGML, will have an impact. On the other hand, more and more parts of CALS are likely to become standards which will then generally be applied. (Molholm).

CD-ROM

What problems do you foresee in distributing CD-ROMs? Speakers have discussed the technical issues of CD-ROM etc. as data stores; the Aerospatiale examples are in-house and new; the only other effective example quoted has been the DEC software distribution service; all other CD-ROM based services are almost unusable; what prospects are there that this situation will improve?

CD-ROM can replace paper in certain areas. DTIC has recently put 250,000 bibliographic citations of unclassified material on CD-ROM for evaluation of the retrieval system by users. With classified material the pressing would have to be done in-house; this is, of course, an economic question. (Molholm).

When one has to deal with classified and unclassified documents CD-ROM is not economic. (Bullock).

The first generation of CD-ROM products was rather poor. The second generation with software interfaces was considerably better; and we now face a third generation with much more interesting products than just bibliographic tools. Bibliographic tools with simple access found their place e.g. in universities, whereas the new CD-ROMs, e.g. with full texts, software and data related to a specific subject area, bring information to the fingertips of the user. (Lawrence).

Economics of management systems

What happens to the workforce profile when a system like PROMIS is installed?

We would have had to increase our (non-productive) workforce in project management had we not had an automated system like PROMIS. We maintained the workforce and achieved a greater throughput. (Hall).

Multilingual dictionaries

Is Aerospatiale's multilingual dictionary available?

It exists as an inhouse database. We have received a subsidy from the Ministry for Industry in France to put the dictionary on CD-ROM and to make it available to private and public aerospace organisations. It will be available early next year; however, it needs to be further improved, not only with regard to the content and presentation, but also with regard to the retrieval software. This will be achieved by cooperation with aerospace organisations in other European countries, and in nine months or so a version will be available which can serve as a valuable tool for translators. (Lavroff).

Computer conferencing

Which procedures are necessary for starting a computer conference?

A moderator or chairman, an agenda or a decision on topics to be discussed, an agreement for people to come to the meeting, and material to be distributed before the meeting, are needed to start up any conference. An additional requirement of computer conferences is to introduce the people to the medium, "so that the medium does not get in the way of the message". Technicians are needed to deal with the mechanics; the participants of a computer conference must be allowed to concentrate on the intellectual part. Computer conferencing is a tool which cannot completely replace face-to-face conferences. In fact, for the same group of people the first conference should be a face-to-face conference which can then be followed by computer conferences. (Pearson).

Fiber optics

Could we have more information on fiber optics; in particular when will all of London have fiber optics, and what about using fiber optics for military telephone systems?

London has fiber optics in (or underneath) most of the major streets, and the major customers have access to it. The whole of Westminster up to St. John's Wood and down to the river, and from Fulham to Hackney is covered in fiber; about thirteen miles by five. The whole of the UK is covered with fiber for the trunk-network and for the junction network which links the telephone exchanges together. In buildings fibers are first installed vertically and then, when required, horizontally to the users' desks. In new buildings plastic tubes should be mounted behind the plaster work. Bundles of fibers can then be blown with compressed air from the basement through the tubes to the desks. Also in the military environment fibers are looked at with favour as, due to the absence of plastics, the risks of fire can be reduced. Another favourable aspect is the absence of induction. (Holmes).

Role of the information intermediary

Taking into account all the technical developments we have heard of these day, what will be the future role of librarians and information specialists? (Newton).

There will not be much change for the professions, however their functions will probably change. Demands are expressed for end-user searching, however, the end-user is not a good searcher. On the other hand, the information specialist (the intermediary) is not really the expert on that what he retrieved, in terms of content. Both are needed, retrieval skill and subject knowledge, therefore the intermediary and the end-user should closely work together, if need should be through telecommunications. An example is Easynet: when an enduser runs into trouble with his search he can enter SOS, and a real life person will help. (Molholm).

If a database is well structured permitting access via a menu then intermediaries are not required. If this is not the case then the intermediary has to stay in permanent contact with the user. As there are not many structured databases there is a good future for intermediaries. (Lavroff).

The role of the information intermediaries will change only in so far as personal contacts with the end-user will increasingly be replaced by contacts via telecommunications. (Van Leeuwen).

The main problem, at least in a library environment, is input, not output. More effort must be put into input, e.g. the use of an online thesaurus for indexing. (Heaston).

My concern is that the message is lost in the media. Computer experts create systems providing general access to 'something', but somebody has to decide how to categorize these 'things'. Librarians have done this already before the birth of Christ. We categorize the world as pre-history and history. And history started with the work of librarians. They hold and categorized information. Input now becomes more and more automated but not categorization, not placing information in a logical place for retrieval. Categorization work will have to grow, otherwise information will be lost. (Molholm).

Coming back to the role of the intermediary, many databases are not directly accessible by end-users; their use requires intermediaries who are familiar with the new information technologies. The number of information broker offices in France is increasing. (Masson).

As the number of databases is increasing and the access procedures are becoming more complicated the information brokers have to become more competent. If they are, they become 'rich', and the rich become richer, the poor become poorer. (Larue).

Technical manuals

Do you envisage a complete change in the provision of technical manuals as presently provided by the Armed Forces (such manuals have to be provided at very low levels such as to an airman mending an aircraft or a soldier mending a lorry, and these people may not necessarily have a read out capability) ?

The whole area of technical manuals was one of the driving forces of CALS. In the long run it is envisaged that the data would be delivered to hand-held screens, with drawings, video images, sound etc. (Molholm).

Supercomputer highways in the USA

Who can provide information on plans in the USA to connect 1000 laboratories with high speed communication lines?

There are in fact plans by the Executive Office of the President and a proposal in Congress for a telecomms 'highway' for linking supercomputer systems between universities. (Molholm).

The National Science Foundation is the primary co-ordinating body behind it. (Rice).

The Hubble Telescope when brought into orbit will deliver about 100 Gigabytes of data every day which will be processed by Canadian scientists. This is the driving force behind the establishment of a high-speed network in Canada which largely is following the ARPANET in the USA. (Brendreth).

Another example are the data from global change: environmental data collected from all over the world. (Molholm).

Standard terminology for the composition of source texts

Traditionally there has been an interest in indexing tools such as categorization schemes and thesauri; with large computer memories there is a tendency to rely on full text searching. This may work in a relatively small user community. However, large database systems searched by a variety of users with different backgrounds and nationalities may be less successful if only full text can be applied. Another problem is the treatment of images as well as text. Standards such as SGML might help to extract bibliographic data directly from source documents; categorization schemes become more and more sophisticated with the introduction of cross-references, and differences between categorization schemes and thesauri are becoming smaller and smaller; computer assisted translation is also becoming more popular; however, all these tools may fail if the source document is not written correctly (spelling checkers, style checkers, glossaries are only a partial solution), but there could be tools to check a document and to suggest a standard terminology. By applying glossary tools the advantages of a thesaurus as a searching tool are automatically built into the source text. Is such a development possible, feasible or not very likely? Would we agree also that indexing and searching should be done more and more by originators and end-users?

There is not one answer. Indexing will be required to identify a unity of concepts across a collection of documents because language changes over time; however, there will be tools (e.g automatic indexing aids) to help in these processes. The same goes for retrieval; there is and will be software for helping the end-user. (Lavrence).

We are experimenting with full text. Assistance is needed on two levels: for the novice user and for the experienced searcher. Some assistance is needed, but we must be flexible and look for new tools, e.g. the concepts used for automatic translation could be very useful for automated searches. Most of the tools will have to be automated in order to make the information systems practicable.(McCauley).

There are quite sophisticated systems for the storage and processing of information. Should we not put more effort in the preparation of texts from the start. Automatic translations are wasted if the source texts are poor. Should we not apply standard

structures and standard terminology in order to achieve better texts which then could be used for automatic capturing, indexing etc., instead of accepting any garbage as input for our marvelous systems? (Ampt).

Perhaps this topic could be discussed at the TIP meeting next year in Norway, in particular the question whether authors should be given guidelines for composing their papers. (Yanez).

If you really want to get into a 'standardized authorship' situation you should not start with authors but at school. Equally I do not believe that it would ever be practical, and I hope it will not. (Hall).

Experience shows that authors do not follow instructions. As long as authors cannot be automated there is a need for an information specialist for indexing. (Heaston).

Computer viruses

What are the real hazards of computer viruses which might enter our systems via networks?

I think we make too big an issue of viruses. (Molholm).

There are anti-virus tools. We would make the biggest mistake if we would not use networks for fear of viruses. (McCauley).

Use of data collected by satellites

Which use is made of data collected by satellites and transferred to the earth?

Very little! Satellites such as Landsat receive and re-distribute to earth stations data at rates of several 100 Mbytes/sec. These data are useful for agriculture, forestry, preservation of natural resources etc., however, only a very small fraction is used. It is recommended, therefore, that much more effort is put into processing these data. (Colens).

We are looking more at the handling of the data after getting them on the ground; however, it is a massive problem. We have concentrated so far more on gathering the data and making sure we loose no single bit and we get it correctly. We now pay more attention to processing and re-distribution. (Rice, NASA).

Several years ago it seemed that, due to the legal status of NASA, Landsat data could be distributed only to the public, not to the private, sector. (Brendreth).

Critically evaluated data.

Users in need of data, e.g. on laser damage assessment and laser hardening, need this data for immediate use. Data are spread over many sources, and even if their collection can be handled they are often contradictory. Therefore, a critical evaluation of these data is absolutely necessary. More should be done in this respect. (CheYen Ho).

The US Department of Defense has 23 Information Analysis Centers 13 of which are supported by the Defense Technical Information Center. They address the question of critical evaluation of data. (Molholm).

The more information is produced the greater is the need to prepare the information in such a way that it can be used directly and reliably. Computer assisted techniques providing access to information have to be improved to meet better and better the users' requirements. The more information is produced the more information analysis centres are needed. For some subject areas information analysis centres exist for many years, some, such as the Gmelin Institute for Anorganic Chemistry and the Beilstein Institute for Organic Chemistry, even since the last century. The Beilstein is now online available (e.g. through STN, Karlsruhe) covering information from 1830 on. Software is being developed for accessing not only bibliographic data and full texts but also tables and graphics. (Tittlbach).

Standards

There are various standards for the electronic data interchange which are partly conflicting. We are often lost not knowing which standard to apply; should we follow the standards of ISO or those of other organisations? (Dahev, Pakistan).

Everybody in principle agrees to apply standards; but often the better (standard) is the enemy of the good (standard). It takes a long time until a standard is adopted. In contrast to patents, standards are prepared mainly by volunteers. We should realize that there are economic benefits in standardisation, and we should therefore be prepared to invest money into standard making. (Ampt).

Closing remarks

Walter Blados, Chairman of the AGARD Technical Information Panel, thanked a large number of individuals for their contributions to the success of the meeting and announced that TIP is sponsoring lectures in June 1990 in the USA, UK and Belgium and that a TIP Specialists' Meeting "Bridging the Communication Gap with the help from Natural Language Processing" is scheduled to take place in Trondheim, Norway, from 5th–6th September 1990.

Questionaire

The questionaires completed by participants after the meeting revealed interest in technologies such as electronic mail, computer conferencing, video conferencing, hypertext, optical character reading (OCR), intelligent character reading (ICR), and barcode scanners; in the role of librarians in the next century; in CALS-like projects; in practical details of leading-edge systems; in interworking between systems; in relative capabilities of hard- and software; and in live demonstrations.

In general, there was more interest in practicalities than in statistics and considerations.

3. COMMENTS ON TECHNOLOGIES.

The most natural forms of communication are gestures, mimic expressions and the spoken word, all understood by kids. Civilization required words to be stored and transmitted over long distances. Writing and reading was the technique chosen, and the kids had to become literate, a process amplified by Gutenberg. Today the 'kids' have to be computer literate or even information specialists in order to find all the 'words' collected and stored somewhere. Is this inevitable? Mankind has developed techniques for the collecting, storing and distribution of information. Should mankind not be able to develop techniques for the easy access to information which would render computer literacy and special training superfluous? There are signs that we and our descendants still have to go a long way, but that this way will lead towards something like an information machine which answers (spoken or written) questions.

The information industry, on its way to become profitable, is proceeding from producing something technically feasible to producing something demanded by users. With profitableness comes competition and more respect for user demands. Therefore profitable information markets like the financial and business information market are served first with user-friendly information products. Medical doctors come next; technicians and scientists come further down the line. In any case there is a trend to break the information market down into fractions corresponding to well defined target groups of users who then are provided with all information they need for their profession. Much effort is put into mixed input (text, images, voice, video) and multimedia output (online, CD-ROM etc.), into the development of software for really easy access to information with a minimum of training, and into collecting and adding value to the relevant (internal and external) information. This development I interprete as a trend towards information machines.

As long as an information machine is not there, let alone on our desk, we, the information services community, must look for ways and means to serve our users best. We must look for relevant data and for technologies to evaluate, categorize, store, retrieve, distribute and make them consumerable for the end-user. Let us look at some of these technologies.

Data collection

Data include text, images, voice and video. With regard to text, traditionally we dealt with bibliographic data and abstracts. They refer to rather than contain information. Therefore the trend, supported by high capacity storage media, goes towards full texts. The texts can be captured in facsimile mode by means of scanners, as done e.g. for the BACON project for 125 million pages of patent documents scanned on behalf of the European, the US and the Japanese Patent Offices (see paper 9), for the ADONIS project which every week produces a CD-ROM with articles in the field of biomedicine contributed by a multitude of publishers, and for the Pressedatenbank of Gruner & Jahr with an input of 1000 press cuts per day. The technology is well developed and permits different degrees of resolution (e.g. 200, 300 or 400 pixels per inch); the scanning costs per page are in the order of 25 cents. Scanning covers images as well as texts, an advantage. However, if the text were available in coded form it would require much less storage space and could e.g. be extracted, edited, searched or translated by computer, transmitted at lower costs etc. Texts can be read into a computer by Optical Character Reading (OCR). If it is available already in scanned form OCR would require first printing on paper and then reading which is rather inconvenient. For this purpose Intelligent Character Reading (ICR) has been developed which in a first step identifies rows of scanned text and then the letters within the rows. The algorithms for identifying letters are more powerful than for OCR; as a consequence ICR can be applied to practically all type faces and even to handwriting. ICR is not yet a mature technology in spite of very remarkable results. As this technology seems to be important for dealing with (internal and external) full text documents it is recommended to study this topic further. As it is relevant to the theme of the next TIP Specialist's Meeting ("Bridging the Communication Gap with Help from Natural Language Processing") an invited paper could deal with it (proposed title: "Comparative Evaluation of ICR Systems"). Another approach could be to induce an organisation such as LINK or International Resource Development Inc. to carry out a multi-client study on this topic and to subscribe to it.

Adding Value to Data

The critical evaluation of data by information analysis centres and the screening and condensation of information for inclusion in handbooks or more advanced devices is an eternal task. Even the envisaged information machine requires continuous updating with knowledge. Librarians and information centres, when dealing with electronic transfer of information, concentrated first on secondary (bibliographic) and now increasingly on primary (full texts, images etc.) information. More user-friendly, however, are evaluated data and handbook-type of information. Many librarians fear that some of their traditional functions will in future be fulfilled by electronic devices. I wonder if they should not take the initiative, e.g. in cooperation with publishers, to urge for, to encourage or even to organise the adding of value to data: for the benefit of their users and their own. And TIP could well amplify such conceivable initiatives of its members by grouping and channelling them.

At the TIP meeting frequent reference was made to the Standard Generalised Markup Language (SGML) which adds value to data, not to their information content but to the facility with which they can be further processed. This reminds me of an automatic translation system (TITUS) which requires pre-editing (transformation of natural language into a language with a limited choice of syntax) before the translation algorithms can be applied. Are we on the right track? "Technology is the effort to avoid efforts" (Ortega y Gasset). With TITUS and SGML we reduce processing efforts but we increase text creation or preparation efforts. These thoughts might sound heretical in the light of the acceptence and adoption of SGML by (at least parts of) the information community. Perhaps it is only a question of finding the right balance between efforts.

Categorization (indexing) and searching (retrieval)

This was the only topic within the scope of the conference theme which was not adequately covered by presentations; it was, however, addressed at length at the final discussion. It appeared that those who spoke at the meeting were of the same opinion that for both, indexing and retrieval, information specialists are unavoidable ("as long as authors cannot be automated"). Knowing that one counter-example invalidates even the most convincing and familiar theory I report that I have recently seen a demonstration of an automatic indexing and retrieval system which can successfully compete with any specialist:

terms (except stopwords) are extracted from full texts (or abstracts) and reduced to stems; linear and an inverted files are established; the query is entered in natural language, and its terms are matched against the files; retrieved texts are relevance assessed; with terms occurring in the relevant documents tight sub-queries (retrieving a minimum of texts but at least one) are derived; the retrieved texts are assessed and the most successful (in terms of retrieving further relevant texts) sub-queries are selected and used for further retrieval and assessment; with now more relevant texts useful terms can more precisely be identified and used (automatically) for further generation of sub-queries etc. The natural language query can be vague; the target of relevant texts is solely defined by the user's relevance decisions. As a consequence, the end-user, who, of course, must be able to identify relevant information in a text displayed, achieves better results than the retrieval specialist who cannot be absolutely sure about the end-user's real information demands. And, the system retrieves relevant texts some of which the retrieval expert did not dream when formulating a (e.g. Boolean) query and therefore missed them. And, training is not required at all, just entering a natural language query and responding with yes or no to the texts displayed. And, indexing by information specialists is rendered superfluous.

This example shows that we must watch for new technologies even in areas the development of which we used to believe is rather stagnant. "New technologies for automatic (full text) indexing and retrieval" could be a topic for presentation and discussion at the next TIP Specialists' Meeting.

Storage

With CD-ROM and the other derivatives of the Compact Disk the technology for the storage of information has made a quantitative leap. 654 Mbytes per disk can meet many requirements. Many of the CD-ROM products we see today did not yet find their markets. Of the products which serve the information market probably those will be most successful which provide easy access to full texts and, even more, those which provide rather complete information to a well defined target group of users.

Organisations which handle classified information, which cannot entrust external organisations with pressing the information on CD-ROM and which cannot afford the uneconomic inhouse pressing are advised to consider WORM (Write Once Read Many disks) with 800 Mbyte (5 1/4") or 2 Gigabyte (12").

Distribution

Many speakers referred to the forthcoming high capacity communication channels, ISDN, fiber optics, satellites etc. which will permit the (mass) transfer of data and texts with acceptable delays. Two recommendations are repeated here: Information and communication managers should now plan to use ISDN, and architects should be urged to have plastic tubes mounted behind the plaster work in new buildings for taking up optical fibers.

An issue Dunning pointed out is the chicken-and-egg situation with regard to the transfer of data via satellites: there are many potential users of high capacity transmission channels but each of them alone would not need and pay for the whole channel and therefore will not approach the carriers (PTTs etc.). As a consequence, the carriers believe that there will not be enough traffic, and they proceed half-heartedly only. It is a question of identifying and collecting demands for information transfer with high bit rates. Should TIP not invite the AGARD community to identify high bit rate demands of their organisations, collect the demands if they exist, and try to join forces with other parties (banks, airlines, newspapers, research centres, universities etc.) in order to establish a sum of demands which would encourage the carriers to meet them?

Integrated Systems

There is a large number of software packages with some or all functions required by information managers and specialists. Many are very similar; therefore the question was raised if we are not quite often re-inventing the wheel. The reply was that user requirements differ from case to case and that therefore tailormade software is needed the development of which costs millions of dollars. STILAS (paper 8) and EPOQUE (paper 9) may serve as examples. I wonder if one could not think of more economic solutions. My suggestion would be to entrust an appropriate organisation with the collection of user requirements, with setting up user requirement specifications, with separating the requirements into many small moduls, and with establishing protocols for linking the moduls. The information industry should be involved in this process from the beginning, and the so established functional moduls and protocols should be given the status of guidelines or better standards. I am sure the information industry would comply. Users could then select appropriate module and entrust system and software houses with the development of functions which are not yet adequately covered by existing modules. Who could sponsor the first step, the collection of user requirements and the setting up of user requirement specifications? Here Dunning's statement comes to my mind that standardisation and common procedures are close to the heart of the Commission of the European Communities (CEC). Perhaps TIP should ask the CEC to make a start with (co?) financing the first step.

Copyright

At the discussion of De Ridder's paper on optical disk systems the question "How does copyright effect the use of CD-ROM?" was raised but not adequately answered, in my opinion. The answer was: "One can arrange that a program copied from a CD-ROM can be used only when disk drive and CD-ROM are available". This is fine for programs but not for texts. I guess that the originator of the question (Stolk) wanted to draw the auditorium's attention to the fact that one can draw multiple paper copies from full texts stored on CD-ROMs and sell them, not to the liking of publishers. This dislike induced the ADONIS group of publishers to make their CD-ROMs, containing (biomedical) journal articles in facsimile mode, available to libraries only and this under the condition that they will get a fee for each paper copy drawn.

4. RECOMMONDATIONS

Recommendations Addressed to Information Managers and Specialists

1. Keep yourself informed about the development of the information services market, e.g. through the annual reports of the European Information Market Observatory which cover market statistics and major trends. Address: CEC, DG XIII, L-2920 Luxembourg.
2. Watch out for new technologies such as hypertext, CD-I, WORM, "Reversible" disk, ICR (Intelligent Character Reading), relational image databases, more advanced automatic translation systems, knowledge based (AI) systems and those which do not have a name yet.
3. Look which new technologies the European, US and Japanese Patent Offices apply; in some cases they are not only protagonists but also de facto standard makers.
4. Plan to make use of ISDN.
5. If you have the slightest influence on the planning of new buildings take care that tubes for taking up optical fibers are installed.
6. Study success stories such as STILAS (Paper 8), EPOQUE (Paper 9), CALS (Paper 14), PROMIS (Paper 16) etc. and consider to use (part of) these systems.
7. Consider the application of SGML (Paper 11).
8. Consider if you should not make use of Japanese information (Paper 3).
9. Consider if you should not make use of earth observation data provided by satellites. See the Section "Use of data collected by satellites" of the General Discussion!
10. If you need a computerized French-English dictionary ask Aerospatiale, B.P. 76, F-92152 Suresnes Cedex. It should be ready in about a year's time.

Recommendations addressed to AGARD's Technical Information Panel

11. At the next TIP Specialists' Meeting "Bridging the Communication Gap with the Help from Natural Language Processing", 5th–6th September 1990 in Trondheim, the following topics should be considered for presentation and/or discussion:
    - Comparative evaluation of ICR (Intelligent Character Reading) systems
    - New technologies for automatic full text indexing and retrieval systems
    - Comparative evaluation of automatic translation systems.
12. TIP should consider if it should not try out E-mail and/or computer conferencing between Panel members and, at a next step, between participants of the annual TIP Specialists' Meeting. A topic for discussion could be the Technical Evaluation Report. If such an exercise would be successful it could be recommended to other AGARD Panels. (Papers 12 and 13).
13. TIP should suggest to relevant information centres and libraries to consider if they should not encourage, group, channel or even organise the critical evaluation of data. See also the Section "Critically evaluated data" of the General Discussion and the Section "Adding value to data" of the Comments on Technologies!
14. TIP, together with interested AGARD organisation, should try to identify demands for data transfer with high bit rates in order to find out if a critical mass for high bit rate telecommunications could be reached in conjunction with non-AGARD-related organisations. The collection of demands above the level of AGARD could then probably best be done by NASA and ESA. See also the discussion of Paper 1 and the Section "Distribution" of the Comments on Technologies!
15. TIP should ask the Commission of the European Communities to encourage the establishment of user requirement specifications for all functions demanded by information managers and specialists (library functions; indexing, storage, retrieval, distribution of information; E-mail, computer conferencing etc.). These specifications could provide the basis for standard information technology modules and for standard protocols for linking the modules. See also the discussion on Paper 9 and the Section "Integrated systems" of the Comments on Technologies!

Recommendations to AGARD Related Organisations

16. Consider to adopt CALS (Computer-aided Acquisition and Logistics Support). See Paper 14!
17. For the storage of classified information consider the use of WORM disks. They can be loaded with information in-house. See also the Section "Storage" of the Comments on Technologies!

TECHNOLOGIES FOR ELECTRONIC TRANSFER OF INFORMATION
THE PRESENT STATE AND TRENDS IN EUROPE

by

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Summary

The emergence of new data storage and transfer media is having a growing effect on the electronic information industry.

Two decades ago, there were only a handful of bibliographic databases, operated over dedicated online networks.

Today the mass storage possibilities of new technologies, potential cost/benefit ratios, integration with personal computers and telecommunications networks are typical perceived benefits.

There are several hundred optical disc applications running in Europe, in business, education, leisure and research. A C.E.C.-sponsored survey has identified many of these, and has gathered the opinions of market leaders on present and future trends.

The consensus of opinion points to a promising market potential for this sector, depending on overcoming a set of key barriers - technical, economic and organisational and on the introduction of new telecommunications facilities.

The European Commission, under its new telecommunications and information market programmes, aims to encourage the rapid development of this sector and to help overcome the barriers to growth. A call for proposals for pilot/demonstration projects held in early 1989 is one example of EC action.

Introduction

Over the past two decades, the electronic transfer of information has evolved in Europe from a mainly public-sector, research-oriented activity, into a growing economic reality. In the early 1970s, there was a handful of online information services, run for scientific, technical and biomedical research scientists. Today, online services aim at market researchers, business professionals and even the general public, on the back of the waves of cheap microcomputers and videotex terminals which are becoming readily available.

This rapid evolution in the application of new technologies has not always been matched by economic successes, to date, although there is a notable market impact in areas such as credit and financial information services in the United Kingdom and videotex-related services in France.

One of the major turning points in the brief history of electronic information services was the launching of the Euronet programme in December 1975 by the European Community, involving the Postal and telecommunications administrations of the EC member countries, information providers and, eventually, user groups. This modest programme aimed primarily to build online databanks in key areas of interest, to construct a single, publicly-available data network in Europe for online retrieval, and to stimulate the supply and use of electronic services through new host services. Euronet was officially inaugurated in 1980, and, having accomplished its main pump-priming task, was phased out as planned in 1985.

Since then, only five years on, public data networks cover all of Europe, are mainly compatible, within certain technical limits, with each other and with networks outside Europe, and provide access to over four thousand publicly available databases around the world.

The period between 1984 and 1989 has also seen the start of many other important trends which all have a potentially far-reaching impact on the electronic information market. The introduction of technologies such as the personal computer, CD-ROM and its many variants, digital facsimile, and integrated services digital networks, is a clear illustration that the pace of innovation in this area is speeding up.

However, the overall picture in Europe is complex and has many dimensions: historical, geographical, economic, social and cultural. In this respect, the situation is not directly comparable to that of the United States or Japan. Many facets of this complexity are expected disappear through the achievement of the single internal market in Europe, starting in 1992. It would be illusory, though, to believe that everything

will change immediately. The process of economic change will filter gradually through to this sector, aided and abetted by important new policies and industrial developments in the general area of information and communications technologies (ICT).

The relationship between ICT and information transfer is there for all to see, but is is very complex. It involves technical, economic and social factors which cannot be foreseen easily.

In order to trace some of the trends and complexities of this relationship, the following chapters look in turn at

- information technology
- telecommunications
- database market development and
- European Community initiatives.

Information technologies in Europe

The Community represents the largest potential market in the industrialised world, in terms of population (323 million inhabitants in 1987 compared with 244 million in USA and 122 million in Japan). Its total Gross Domestic Product of 4.200 billion ECU in 1988 is close to that of the USA (4.300) and well above that of Japan (2.600). The same holds true for industrial production, where the Community is second only to the USA. The Community's share in world trade is around 1.2 times that of the USA and twice that of Japan.

Competition in the coming years is expected to be particularly strong in the high-technology industries such as office automation, electrical and electronic goods and chemical/pharmaceutical products. The Cecchini report on the single market and on the cost of non-Europe has highlighted continuing weaknesses in Europe's trade performance in many of these industries.

The viability of Europe's information and communications technology industries will be increasingly important in the 1990s with the opening of new markets through the introduction of a wide range of new products and services such as HDTV and Integrated Broadband Communications.

In the Information Technology area, there was great concern in Europe in the early 1980s that the industry was being affected by low market shares, low research and development and low capital investment. The balance of trade in IT products was negative, amounting to a deficit of approximately 11 billion ECUs in 1984.

Since 1984, several major concerted actions have been initiated at national level (eg. Alvey Programme in United Kingdom), through inter-governmental initiatives (EUREKA programme) and at European Community level, through ESPRIT, the European strategic programme for research and development in Information Technology.

In strict quantitative terms, the situation in the information systems industry is now different.

- The largest European IT companies have significantly increased their own domestic market share from 33% in 1983 to 50% today.

- They hold a favourable position in the software and services market taking advantage of strong growth in demand.

- European IT companies are now investing in R+D a similar proportion of their revenues to US companies.

- Capital expenditure in IT reached in 1987 a level higher than that of US companies, though still lower than Japanese firms.

There is still much to accomplish before the balance of trade situation is re-established, however, particularly in the area of components, semiconductors and information processing systems. These areas have been given priority in the current (ESPRIT II Programme, with over 150 projects in areas such as microelectronics, office systems, computer integrated manufacturing and I.T. applications technologies, and in the new JESSI Joint European Submicron Silicon) programme of EUREKA for semi-conductor research and development.

Telecommunications

Telecommunications is the life support system for the electronic transfer of information.

Various estimates place the turnover of the total European telecommunications market in 1987 at between 60 and 70 billion ECU, some 20% of the world market, and growing at a cumulative annual rate of 9% to reach 105 billion ECU in 1992.

However, telecommunications did not always grow at such a rapid rate. It has taken 140 years for telecoms services to evolve from telegraphy to the present-day dozen or so principle services, some of which are direct spin-offs of others.

Today's main public services in the European Community, useable for the electronic transfer of information, are:

- telegraph
- telex
- telephone
- slow telecopy (1 min. per A4 page)
- low rate data transmission
- circuit-switched services/leased circuit
- videotex low rate
- cable television
- mobile telephony.

With the gradual emergence of High Definition TV, where a worldwide standard is expected to be announced in 1989 by the International Telecommunications Union, ISDN (Integrated Services Digital Networks) and Integrated Broadband Communications, the number of services is likely to double or triple by the year 2000. The associated finances for these developments are considerable. The European PTTs had a global revenue from public telecomms services of 53 billion ECUs in 1987, invest 20 billion ECUs annually, and employ around one million people. Voice telephony accounted for between 85-90% of their revenues in 1985, with up to 5% from telex and 1% from data services.

There is no simple way to gauge the size of the user population. The estimated number of terminals and subscriber equipment units installed gives some handy indicators:

- 77.4 mio business telephones installed in Western Europe in 1988, rising to 94.4 mio in 1993

- 620 000 telex machines in 1985, 770 000 in 1988, decreasing to 504 000 in 1993.

- 250 000 telefax/PSTN/Group III in 1985; this number is increasing rapidly: 659 000 installed terminals start 1988, increasing tenfold by 1994 to 6 360 000, according to Logica.

- 823 000 lowspeed modems in Western Europe in end 1986, compared with approximately 3 million in USA in 1988. ISDN links at 64 Kbits/s will not require modems.

- Business and professional microcomputers: 8 million total in Western Europe (10% connected to data networks) in 1988, 14 mio estimated in 1992.

- Videotex terminals : 4.8 mio public videotex terminals in Western Europe in May 1989, of which 4.5 mio in France alone.

- Sixteen public national data networks based on packet-switching technology.

- Electronic mail-boxes run by western European PTTs: 133 000 in 1985 and 1 170 000 in 1994 (Logica/Telematica).

- Over 13 500 000 teletext decoders in Western Europe by start 1988, according to European Broadcasting Union.

Even though these figures seem impressive at first glance, they do not compare well with the United States, where the telecommunications sector is twice as large, and is experiencing early growth rates. The fact remains that the fragmentation of the European market has led to waste of investment, eg. in national solutions to digital switching, to incompatible videotex systems to different market approaches, and consequently to lack of growth. Link points out that lack of standardisation and long approval procedures make the cost of a PC modem card ten times higher in Europe than in US ($ 250 to $ 25). The overall telecommunications equipment market in Europe is growing by less than 5% per year, compared with 8% in USA.

The challenge that this situation presents is recognised in several interlocking actions undertaken by the European Community for the future development of telecommunications in Europe.

Firstly, the aim of the CEC's 1987 Green Paper on the development of a comron market of telecommunications services and equipment is to plead in favour of a liberalised regulatory environment which gives both service providers (including PTTs) and users more flexibility in the way in which networks are used. This means, for example, being able to offer value-added telex services over telephone or data networks. The Green Paper sets out ten main approaches for bringing the regulatory environment more into line with technical progress and the evolution of market requirements. One of these approaches, the liberalisation of the supply of telecommunications equipment, is currently the object of an EEC Directive based on Article 90 of the Treaty of Rome, which empowers the Commission to take steps against "the prevention, restriction or distortion of competition within the common market" and "any abuse by one or more undertakings of a dominant position... in so far as it may effect trade between Member States" (extracts from Articles 85 and 86).

The second major action of the Community is the stimulation of the construction of advanced digital data networks in the EC and especially the coordination of the future development of an ISDN infrastructure. The Member States are investing some 1.9 billion ECU annually on ISDN equipment up to 1992 for a market potentially worth over 36 billion ECU. The CEC's Recommendation of 22 December 1986 covers ISDN norms, tariffs (reducing reliance on distance-independence), services (64 Kbit/s basis for telephone, telecopy, teletex, videotex, image transmission, etc.), and the introduction schedule. The PTT administrations, according to the Recommendation, should plan their networks so as to provide 5 million ISDN subscriber lines by end 1992.

Since 1986, five European national networks have started basic commercial operations and the CEPT (European conference of PTT operators and administrations) confirmed in May 1989 the goal of the 1992 introduction date for a pan European ISDN service using common norms. The momentum is clear.

Thirdly, the post-ISDN generation is already envisaged through the Commission's RACE (Research into Advanced Communications for Europe) programme of research and development for the introduction of integrated broadband services in Europe, starting from 1995. Initial work carried out since 1987 has covered the development of an IBC (Integrated Broadband Communications) Reference Model, systems analysis, development of tools and standards, testing of different supporting technologies, softwares, terminal hardware and subsystems, and the testing of network interconnections.

The December 1988 IBC strategic audit has confirmed the RACE objectives and recommended that user requirements be defined in more detail through pilot field applications, starting 1990. Specific R+D application programmes are already underway in the areas of education (DELTA), medicine (AIM) and road transport and safety (DRIVE).

Finally, the CEC has taken specific care of the needs for a cohesive infrastructure throughout the Community Member States and regions, through the 1987-1991 STAR programme for special telecommunications action for regional development. STAR is financed from the Regional Fund (750 MECU of 1,4 BECU total) and applies to building physical infrastructure in less-favoured regions of seven EC Member States.

In conclusion, the important telecomms sector is one where Europe is leading the world in terms of trade balance. However, it should be clear that it can take many years for widespread public switched data networks to meet user satisfaction, as illustrated by the 1987 EUSIDIC survey of packet-switched networks in Europe. The survey concluded from widespread evidence that one in three calls (1525 out of 5225 reported calls) to a PSDN were unsuccessful, mainly due to problems occuring in the network or the local access mode. The repeat survey in 1988 revealed an average call fail rate of one in four.

It is likely that each new telecommunications technology will need to go through the inevitable evolutive stages of research and development, innovation, integration, service introduction and routine exploitation. The net effect of the EC's programmes will be to reduce the time lapse between these growth phases.

Database developments

It is no mere coincidence that 1989 marks the twentieth anniversary of manned space flight and of online database retrieval. Lockheed DIALOG, the world's biggest online host, started life in 1969 as a service bureau to NASA. The database supply market has expanded in many different respects since 1969: number of databases, different kinds of technology base, different kind of content, origin and access mode.

There exist several families of database types, each with their own advantages and constraints, and different access and retrieval techniques.

The main kinds of interactive databases available are:

- online ASCII (bibliographic, numeric, factual, full text)
- online non-ASCII (videotex, teletext)
- local magnetic media (floppy data, detachable hard disk)
- local optical media (WORM, CD-ROM, videodisk, CD-I) and
- online optical media (image servers, remote jukeboxes).

It is not easy to quantify the volume of the database supply market. There are many files and sub-files, different versions of the same database, files buried in electronic mail servers, data sets which are indistinguishable from programming packages, and so on.

There are also hybrid databases emerging which span several technologies. For example, a CD-ROM can contain a subset of an online database and include the retrieval software necessary to access the mother base.

However, for those databases which are integral, non-duplicated and dissociated from processing packages, some statistics do exist. These statistics indicate to all market observers, especially those such as Frost & Sullivan and LINK, that the online market is growing rapidly.

Steady growth trends of approximately 20% per year between 1985-1992 of the Western European market turnover are noted. Total Western Europe revenues over the period 1988-1992 are estimated by [illegible]K to increase from 1.8 billion ECU to over 3.6 billion ECU.

The major bulk of this turnover is generated by real-time financial information services (foreign exchange and securities) notably Reuters, who grossed over 1,5 billion ECU in 1988, according to their own release. Other major areas of revenue are, in decreasing order of importance, fund management, STM (science/technology/medicine), company credit, econometric data, marketing data and personal credit data. No major turnround is expected during the next five years. STM revenues are likely to remain stable.

However, the revenues for professional online information databases do not provide the full picture. Revenue from videotex services will be substantial. Teletel revenues in France jumped from 110 MECU in 1986 to an estimated 360 MECU in 1987, of which 50% went to the 7 000 or so information providers. The public KIOSK service accounts for almost 50% of Teletel annual traffic of 70 million connect hours.

The number of commercially available online databases in Europe has risen from approximately 350 in 1975 to over 1145 on 203 hosts in 1987. The worldwide figure in 1987 is in the order of 3240 available on 597 hosts. 890 of these databases originated in Europe, the bulk coming from the US. One third of the databases produced in the EEC originates from the United Kingdom. Other major producing countries are Germany (18%), France (14%), Italy [illegible]%) and Spain (10%).

A more detailed analysis reveals that 264 of the European-origin databases are bibliographic, 2[illegible] are referral files, 129 factual, 150 fulltext and 47 time series of statistics. The spread is practically the opposite for US-origin databases, where full-text and textual/numeric databanks total over 900.

It would be presumptious to read too many consequences into these figures. One cannot compare quantitative figures with qualitative assessments. As with book publishers, a large proportion of any host's revenues is often accumulated through a small number of databases, and many other files, although available, are hardly used. Furthermore, as is the case on both sides of the Atlantic, many databases are made available as part of public policy, for example in the research and development field rather than in response to market demand. The ratio of public to private sector investment in Europe is practically the inverse of that in the United States. The often-quoted ratios are:

- Europe 70% public-funded databases, 30% private
- United States 25% public, 75% private.

However there is a continuing trend towards trade, business and social science databanks, which the CEC also encourages.

The increasing number of online hosts has some disadvantages: more retrieval languages, connection procedures, bills and accounts, etc., for the user. The interconnection of hosts and the emergence of intelligent gateways like Easynet aim to reduce this problem, but would need to be implemented on a full scale to make the proper impact.

Optical storage media

The use of optical storage media for information storage and retrieval has given rise to a spate of recent market developments.

These developments can be viewed under several angles: type of application, technological capacities, market penetration.

The first products to appear on the market were the analogue videodiscs, notably Laservision. The four types of Laservision disc correspond to an increasing capacity for interactivity and to handle data. Such discs can be piloted by microcomputers, and the hybrid Laservion-Rom disc, as used in the BBC Domesday Project, can hold analogue images (54 000 frames) and data (324 Mbytes).

There are several hundred applications in Europe based on Laservision. In France, for example, 168 projects were recently identified and classified as either information products (12%), promotional (17%), educational (22%), decision-making tools (19%) or archival management tools for photo libraries and image conservation (30%). The source material for these types of applications is increasingly already in digital form, for example, from computer graphics, digital body scans, remote sensing data. There is also a growing number of possibilities for retrieval from videodisc, including microcomputer-based windows and hypermedia retrieval packages, remote piloting e.g. via Minitel, multi-screen workstations coupled with jukeboxes, and interactive stand-alone consoles.

Despite these technical developments the market penetration of videodisc technology is comparatively low, being hampered by systems incompatibility and standards problems, and high replication costs. The videodisc is not yet a recognised mass distribution technology: only 35 of the 168 French applications are commercialised.

A parallel contender to videodiscs is the digital optical disc family for read/write applications such as document archiving in offices. Filenet and Philips Megadoc are the best-known examples. The Commission has sponsored experiments for the use of DOD for full-text storage and retrieval in conjunction with on-line databases.

The approach was to avoid stand-alone dedicated solutions, and to promote modular systems which could be linked to different peripherals and to networks. The Transdoc project pioneered this approach, has led directly to several important applications which exemplify the current role of the DOD. The European Patent Office has commissioned a series of contracts to digitise its whole patent holding of 67 million pages using the Transdoc approach. The new scientific and technical institute of the CNRS in Nancy, France, will place two thousand journals on a DOD jukebox, with an estimated 60 000 pages per disc.

An important evolution pioneered in Transdoc is the linkage of DOD systems to the telephone network, electronic mail and recently to ISDN networks such as Numeris in France. This allows document images to be transmitted directly from disc to user through telefax or high-capacity workstations. A number of important standards issues are involved here, for example inter-system connection using OSI or UNIX protocols, and at at the information format level a standardised document identification scheme - a extension to the ISBN concept.

However, as far as database publishing is concerned, the recent trend has been towards the compact disc and its derivatives. The table below gives a short list of the currently identified CD-technologies, all stemming from Philips/Sony unless otherwise stated:

CD-DA	Audio, music.
CD-ROM	Data stored in digital form (ASCII or facsimile).
CD-ROM-XA	Extended architecture with CD-I like feature for images and graphics.
CD-ROM + DVI	Digital Video Interactive by General Electric and RCA, an add-on compression/decompression technique for image/graphics handling.
CD-I	CD-Interactive. For consumer-orientated images, sound, graphics, and data such computer programmes.
CD-Double Density	Double density CD-ROM by Nimbus, with projected capacity of 2.5 Gbytes per disc.
CD-WO	Write-Once. Philips/Sony proposal to allow hybrid read-only and write-once functions on the same disc.
CD-R	Taiyo Yuden proposal for full write-once, non-erasable disc.
CD-V	Compact version of Laservision, for analogue video and digital sound.
ICVD	Interactive compact video disc, by SOCS Research. Inc, for analogue video and digital sound. Different format to CD-V.

Finally, the appearance of erasable magneto-optical discs has been announced by market observers as an area of considerable growth over the next five years.

Among these technologies, it is useful to examine more closely CD-ROM, as it is most relevant to the topic.

CD-ROM developments

Until recently, it has been said rather unkindly that the CD-ROM market consisted only of consultants, conference organisers and publishers. One view is that, the number of seminars and publications reflected the level of controlled panic which existed when CD-ROM was first introduced in 1985.

Many questions arose, which have still not been answered :

- will it replace online?
- what are the costs? to whom?
- which is the best software?
- will users buy drives?
- are standards adequate?

The issue was furthered confused by the precipitate announcement of CD-I, which at the time seemed to represent a threat to the industrial support given to CD-ROM.
Today, market reactions to the announcement of technologies such as CD-V, ICVD, CD-ROM XA, DVI, CD-WO, etc., seem more temperate, as the number and quality of information sources on CD-ROM are increasing. Many PC magazines now cover the topic.

The actual shape and size of the CD-ROM market is now relatively clear, although, as Julie Schwerin of Infotech has pointed out, there are many traps which face the unwary observer. Titles are announced before they are available. They may be in-house applications. They may be pilot or demonstration applications, or given away free.

In spite of these problems, it is estimated by Infotech that there were at end 1988 a total of approximately 300 commercial CD-ROM titles (among 580 products in total) compared with eighty-four in 1987 and an installed base of 170 000 CD-ROM drives worldwide. Some 50 titles are of European origin, coming from at least eight different countries.

There are an estimated 25 000 drives installed in Western Europe. The penetration of CD-ROM in Europe is heavily concentrated in a few national markets, especially in Italy, Federal Republic of Germany, France and UK. The explosive growth in Italy (over 13 000 drives in 1988) is partly explained by the lack of public telecommunications infrastructure, but is certainly also due to the strong presence of Olivetti, agressive CD-ROM vendors and the availability of PC-compatible equipment.

Despite the apparent attraction of CD-ROM's for end-user full-text publishing products, the type of application CD-ROMs cover seems, surprisingly, to be oriented equally towards full text, bibliographic/referral and numeric databases. EC-origin database titles are mainly source databases, whereas at least one third of US CD-ROM databases are bibliographic. Full text and graphics databases have started to appear only recently, with the advent of windows-type applications, the spreading application of digital facsimile scanning, and an increasing familiarisation with vector coding methods for diagrams.

It is also necessary to take into account the growing variety of software packages, the availability of data preparation, premastering and mastering services, pressing plants, different drive models and the commercial arrangements and approaches of vendors.

The sector is also subject to an albeit improving standards problem. Only 5% of CD-ROM titles conform to the ISO 9660 file format standard. 60% are still in High Sierra Group (pre-ISO) format and the rest have customised formats. It is also important to note that information formatting standards like SGML (Standard Generalised Markup Language) are starting to be built into CD-ROM database design specifications. Users also need the right combination of hardware bits and pieces: bus or SCSI interface, correct graphics gard, MS extensions, minimum RAM working area or harddisk storage capacity, driver routines, and fast enough cpu processor to handle windows-type applications smoothly. The seamless integration of CD-ROM with users' existing equipment and practices is not yet there, but more likely than with online databases, and can be expected to be complete in the near future especially with half-height integrated drives.

In order to achieve economies of scale in this market sector, CD-ROM should address both the database publishing market and the in-house corporate publishing sector. Firstly, publishers must decide to take the leap, possibly with a new generation of portable, mass-produced CD-ROM readers which is expected to appear. Apart from publishers, large corporations with documentation requirements which can be met by CD-ROM are also likely to provide the all-important "market pull". One only needs only to think for example of the influence which a car manufacturer and his dealer/repair garage network could exert on the design or specifications of a CD-ROM product.

European Community initiatives in the information market

The Commission of the European Communities has followed and stimulated the development of the electronic information market since 1971, when the Council of Ministers pleaded for a faster and more efficient transfer of information between Member States using the most modern and cost-effective means.

Since then, four successive programmes have give rise to:

- the creation and opening in 1980 of the European online information network Euronet, based on packet-switching technology
- the development of over eighty new online databases
- promotion of European online hosts at international level
- realisation of ten technology application projects for electronic publishing and document delivery (DOCDEL)
- creation of ECHO, an online host for training of new users and testing new technology combinations such as videotex, telex, and audiotex access to online databases. ECHO recently greeted its 5000th subscriber
- co-funding of nine CD-ROM database projects, each of which incorporate some advance in economic, userfriendly or technical aspects. These projects cover four main types of database: merging files of existing bibliographic databases, bibliographic

reference mixed with scanned graphics, encyclopaedia and directory type information, and full-text scanned documents. The last case, the ADONIS project, tests CD-ROM capacity to the limit by producing 50 CD-ROMs containing up to 5000 scanned pages each, per year.
The service is handled in a jukebox run by a PC AT microcomputer. The initial test results have encouraged the group of ADONIS publishers to continue into routine operations.

In 1988, a new two-year programme called IMPACT (Information Market Policy Actions) was launched.

IMPACT comprises two main chapters, firstly to deal with the improving general market conditions for electronic information transfer, and secondly to provide a testing ground for the demonstration of advanced information systems, which can throw into relief the possibilities and constraints of a variety of new technologies and techniques.

The main lines of action are:

1. setting up a European Information Market Observatory, to supplement valiant efforts made elsewhere to track the state of the market and to detect major trends. It consists today of a panel of 500 observers (users and suppliers) around Europe and will produce annual reports. Several of its preliminary findings are quoted in this paper.

2. Overcoming technical, administrative and legal barriers. The Commission is exploring with information providers (IPs) and users the demand for simplification and standardization of access to database services and the prospects for achieving agreement on such standardization.
It is investigating the nature of legal and administrative barriers and possible means of removing them. The monitoring and advisory work of a Legal Advisory Board is being carried out in the following priority areas : intellectual property, authentification of electronic signatures, computer fraud, liability in relation to information services, confidentiality in relation to information services,

3. Improvement of the synergy between the public and the private sectors. Studies and workshops are being undertaken for the preparation of guidelines, recommendations, etc., to:

   - stimulate the setting up of European information services;

   - help the public sector in decision-making related to making information available externally;

   - encourage the private sector exploitation of public sector data;

   - improve the transfer of Member States' experience in encouraging such private sector exploitation of public sector data;

   - improve the transparency of public sector policies for such private sector exploitation of public sector data, e.g. conditions for the direct provision of database services by the public sector, pricing policies, etc.

4. Promotion of the use of European Information Services. To supplement the efforts of private sector Information Providers (IPs) and Member States, the Commission sets out to:

   - provide objective information about the services available from Community IPs e.g. by means of multilingual directories;

   - give guidance and training for users where not available from a readily-accessible IP by means of amongst-other things strengthening of help desk facilities;

   - act as an outlet for new services, if requested by a Community IP;

   - perform a promotional campaign for the use of Community information services.

   The available Commission infrastructure such as ECHO will be used for these activities.

5. Preparation of an action in favour of libraries. In parallel to IMPACT, the Commission has embarked on the preparation of a project to interconnect libraries in the European Community on support for the use of libraries and on encouragement for the introduction of the application of new information technologies. A new programme proposal is expected by end 1989.

   Two highly successful forums and a coherent series of survey of facililites and library holdings in different Member States have been completed.
   The fundamental role which Europe's 75 000 public libraries play in the information chain is evident. However, despite strong interest, there is

relatively low penetration of information technologies, at any given level. The libraries' actions will concentrate a selective number of themes, designed to stimulate the development of common tools and resources such as catalogues, to encourage the interconnection of library systems using Open Systems Interconnection protocols and to broaden the development of library services using electronic means.

6. Pilot/Demonstration projects. The launching of pilot and demonstration projects is one of the most important aspects of the IMPACT programme. It is designed to stimulate breakthroughs in the quality, performance and use of advanced information services in Europe, designed for users who are not experts in information technology.

   The aim of the projects is not to develop technology as such, neither hardware nor software, nor to promote communications media or messaging services independently of the information content. It is rather to match innovative types of databases including full text documents and images, to the most appropriate advanced technology, whether online or on local magnetic or optical storage media.

   The Commission therefore invited consortia of European IT organisations and information service providers to make proposals for co-funding projects.

   In order to identify subject areas suitable for launching of projects, the Commission had published on 17 July 1987 a call for declarations of interest, resulting in 715 responses. From this massive response, seven priority areas were identified, and specific proposals invited:
   - image banks
   - intelligent interfaces to information
   - patent information
   - tourism information
   - information on standards
   - road transport information
   - cooperation between libraries.

By March 1989, over 650 organisations cooperated in presenting 167 proposals to the Commission. The proposals would have cost a total of 438 MECU if all were implemented. The contribution requested from the Community totalled 146 MECU, seven times the actual budget available.

By June 1989, the number of proposals was whittled down to a list of sixteen, considered as first priority for co-funding. The main criteria for the selection of the short list focussed on five major aspects: the value of the information content and presentation to the marketplace, the appropriate choice of information technologies and infrastructures, the suitable choice of user population for the project, the soundness of the proposer's development plan and the expected market impact.

The overall technical approach of the proposal was considered important, but not as an overiding concern. This meant in practice that technical development work should take full advantage of existing systems and infrastructures, or of those anticipated over the next two to three years. The proposers were asked to concentrate more on the definition and provision of innovative products or services to the user, at international level.

The provisional short list of selected proposals in summarised below. It is expected that the project negotiations will be finalised by Autumn 1989.

The short list includes but is not limited to:

- digitised European patents documents
- enhanced graphical system for generic chemical structures
- patent synonyms file
- portable information devices for technical documentation
- multi-media information on Europe-Latin America relations
- multi-media networking atlas of the Mediterranean region
- intelligent interface to European databases
- intelligent interface for professionals and small and medium-sized entreprises
- domain independent intelligent information and services network interface
- computer assistance in retrieval dialogues
- neutral European system for tourism information
- touring information system (hotels, accommodations)
- information network for fairs and congresses
- structuring full text with SGML, the Standard Generalised Markup Language
- intelligent interface to construction standards database.

Conclusions

Whilst the above factual information, estimates and speculative comments provide rich ground for analysis, it would be difficult to draw any one set of conclusions.

There are, however, some leads and implications that can be outlined.

Firstly, existing electronic information services and related public policies are maturing. The Court of Auditors reports on the German specialised information programme and on the French Teletel network are clear illustrations of the fact that electronic information services are no longer the preserve of specialised professionals.

Secondly, this paper argues that the pre-conditions to faster and more rational growth of the information market, lie in the stimulation of a healthy competitive climate, where barriers to international trade are identified and tackled in a coherent way.

Thirdly, the accent of new technology-related programmes, especially those aimed at research and development is gradually shifting towards applications and usage. This trend will shorten the gap between information transfer techniques and the technologies available. Standards issues are consequently becoming more prominent. The Commission, through the European Norms Committe (CEN/CENELEC), ECMA and ISO actively pursues the definition and implementation of functional standards for IT products and systems. The newly-created European Telecommunications Standards Institute and the network of Conformance Testing Centres are practical steps in this direction.

Finally, in the specific sector of the electronic information market, the Commission is already planning out its activities in consultation with member States and industry actors, over the next few years. The first indications are still that there is still a strong challenge for any Community programme in this area.

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TECHNOLOGY FOR ELECTRONIC TRANSFER OF INFORMATION: THE PRESENT AND FUTURE IN NORTH AMERICA

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Developments in the electronic transfer of information are largely led by advances in technology. This has been true and continues to be so today. This paper will address the technologies of today, how they have advanced, and what effect those advancements have had on the products being delivered as well as on the information industry and its member companies. The successful delivery of information, however, is not completely dependent on technology. Successful products (and the technologies they utilize) are firmly rooted in the markets they serve. The importance of a product meeting a market need cannot be overlooked. How products, born of technology, have addressed market demands (when successful) or not addressed (when unsuccessful) will be included for both the past and present with an eye to what the lessons learned portend for the future.

The position of the United States information industry today must be attributed first and foremost to technology. While it is obvious that the industry wouldn't be where it is without technology, it is less obvious that the industry has been what Dr. Edward Kennedy, President of BIOSIS, called "Technology Driven." He was describing what has been and continues to be true--the information industry has largely failed to anticipate devices, methods, and other technological tools. The technological changes take place first; information providers then react to them. More often than not, they react by accepting a new development before thoughtfully evaluating whether or not their market needs, wants, or will use the new, highly touted technology. This tendency to be led by technology has resulted in missed opportunities as well as adaptations that have had a negative effect on the products and customers. (1)

BACKGROUND

Any discussion of today benefits from a review of information technology models from the past. Before focusing on technological advances affecting information dissemination now, it is important to have a benchmark against which comparisons can be made--printing serves that purpose well.

The Gutenberg technology developed first. It suited its environment; the printing business succeeded. Indeed, of all information dissemination technologies, printing may well be the most successful for these reasons:

1. Positive economics: Books were affordable, facilitating their acceptance.
2. Ease of distribution: The physical nature of the printed product made its distribution, use, and retention easy and convenient.
3. Market: Concurrent with the appearance of print was the emergence of an audience (market) who could use it--literate people, beginning with the monks and eventually expanding to the population at large.
4. Timing: The advent of the Renaissance, that extraordinary event with its desire for recorded knowledge, coincided nicely with the technology.

With this four-factored basis for evaluation of technologies in use or under consideration today, we can determine the probability of a technology having a positive impact on the information industry. The technologies we will examine are online, optical disks, knowledge software, videotex, and gateways. We will not only relate each technology to the printing success model but also consider how it is able to happen, how it is being accepted (or why it is being demanded), and where it might go from here.

ONLINE

Online information access has been commercially available for more than 16 years. It is a particularly interesting dissemination process because of the number of technological events that had to be present to make it happen at all--and because they did not all happen at the same time.

Data processing, meaning little to the primary and secondary information distribution chain at the time, made computing and data correlation possible. It would be applied to text processing and forced people in "information" to resort to codified versions that, in turn, made use of data processing technology.

The introduction of tape and disk storage media was also crucial. Tape made it possible to put text into a compact format, although the tape format, itself, was severely limiting by the necessity of arranging records in serial order. Disk storage eliminated this barrier and enabled information to be processed randomly. Cost effective digital computers were also required for online access to emerge. Digital computing could not be employed in any information enterprise until a reduction of its cost per operation allowed it to be applied to the text processing of tapes and disks. Telecommunications rounded out the technologies that, once all were in place, made online access possible.

Online Then

Evaluating online access in terms of the four requirements for success of a new technology--economics, distribution, market, and timing--supports the thesis that online access was a technology that forced its market rather than responding to it. It is, therefore, not surprising that it has taken more than a decade for online access to "catch on" and that, indeed, online providers are still searching for that magic entry into unyielding markets. The economic factors of online pricing and network charges were as critical as the economies of computing that made online possible. In addition, the audience (or market) had to perceive that the value of the information justified the costs of the systems used to retrieve it.

In ease of distribution, online scored better. Online access to information broke down the "information site" barriers ever present with print and microfilm that were stored in one central location. Now information could be used and accessed even if it were stored in a remote location. The only fallacy of the distribution was the absolute requirement that the market had equipment to communicate and receive the data--at its simplest, a terminal.

A ready market was, perhaps, the major hurdle for online--and remains so today. The technology would be accepted only when the marketplace achieved a certain "literacy." Just as buying a book was inadequate if one could not read, recognizing the existence of the technology and having all necessary equipment to utilize it were not enough. The technology was presented to the public in such a way that the market had to know how to use it--the reason for and purpose of all our education and training courses and materials. The problems of creating a literate market remain with the technology today and, in fact, are the impetus for much of the development work being done.

With timing, online fared better for there was a growing awareness of computer technology and the feeling that there was more to do than there was time in which to do it. There was also the realization, in many circles, that time was, indeed, money. Competition in business and the growing mass of information that overwhelmed those who needed it combined, nicely, to highlight the desirability of online information. This led to the acceptance of the technology in circles where knowledge was a premium.

Online Now

That is all history--what was going on in the early years. But that environment is basic for understanding where we are now. The economics of online, for example, still thwart wide usage. Major systems are still trying to work with the pricing model to make it more predictable, more understandable, and more affordable. It is interesting to note, however, that new systems are still following the original time-sharing metrics, even though they have been proven imperfect. Standard & Poor's, for example, is directly offering its Bond Guide online. While it utilizes a menu system, it still is priced at dollars/month, dollars/-connect hour, and dollars/records retrieved. The awareness of the problems of current pricing schemes and the need to solve them have been a major impetus to gateways, which are discussed later.

The original distribution barrier of "special equipment" being needed for access to online continues to exclude a major segment of the potential market. It is true that personal computers have replaced terminals as the preferred means of access. It is also true that personal computers are found in most companies, sometimes on every desk, and in many homes. In spite of their prevalence, it is still reported that only 25% of computers have modems.(2) Since online access is via a telecommunications link, only when modem installations become the norm will online access be able to increase its market penetration. The fact that most current and potential online information users gain or will gain access with personal computers, however, has opened the door for software development and new technologies.

As mentioned before, making the market accept the technology continues to be a major hurdle. Originally, most of the information available was research-based; based on still another technology, photocomposition, machine readable texts for research material open online to a library environment. After 16 years, one can safely say that libraries have accepted the technology, achieving the necessary literacy level to utilize it.

Over time, however, the information itself has changed. As the technology gained exposure and acceptance as a desirable distribution medium, the products offered have expanded beyond pure scientific research. Now there are consumer interest databases, financial databases, business information databases, directory databases--databases of interest to the end user. The fact that the end user could be anyone--the identifiable market has now grown to include anyone who needs any type of information. The fact that many of these people are computer-literate only heightens the interest of the information systems. Reaching them, however, has proven to be difficult.

In their attempt to be successful in this quest, online systems have changed. Dialog, for example, has introduced modified versions of its online system. Using a preselected set of databases and a menu search option, Dialog is targeting end users through its Connection product/service line. It has recently added, to the Business and the Medical Connections, the Corporate Connection. This service offers end users a menu option to run quick information searches on 200 databases, leaving the more in-depth searches to the specialist. With the package, Dialog offers multiple passwords for a $1000 fee. There is also an online help service and easy to understand documentation. Dialog has also loaded a database of its Blue Sheets--the one piece of Dialog documentation that a user really must use if the cost of searching is a consideration. Now, with this documentation online, a user can locate the necessary file specific data without having to buy and/or keep up-to-date the Blue Sheets for each and every database.

Still, searching online is a skill--one that is not particularly easy to learn and one that is hard to maintain as products/systems change or as time between searches increases. Because of this, there is considerable interest and effort in developing a go-between--something between the customer and the service that will make things easier.

SEARCH AID TECHNOLOGY

Front end software has been around for some time, enjoying measured success. Developers still are working on packages--now often focusing on a specific system. Chemical Abstracts Service, for example, has introduced STN EXPRESS--designed to ease the burden of searching for the chemist as well as to exploit the system capabilities, once reserved for only search experts.

More advanced software is employing artificial intelligence (AI). The concept of AI is not new--a diagnosis program was written for the medical community at Stanford University, California in the 70s. The key is that now International Business Machines (IBM) and Digital Equipment Corporation (DEC) are putting money into AI and marketing systems for a variety of industries. IBM has targeted the insurance industry--its initial launch is a program to identify the best risk drivers. The system encodes the experience, knowledge, and logical approach of skilled underwriters. DEC uses its SCON system internally to check product orders for configuration consistency while ensuring prompt delivery. Another system, centering on the Apple Macintosh II, is being sold to government intelligence agencies.

None of these systems, however, is truly a "thinking" AI--those systems are yet to come. There are two ways to approach a thinking system--to use computers as symbol processors to duplicate the results of human thought or to model the machine on the brain itself through the creation of neural networks.(3) Each of these is now the center of intense interest and activity. It may be years or decades; but once these systems are functional, the business world and the information world will never be the same.

Currently, work on expert systems is growing among the university research communities. At the University of Houston, in Texas, there is a program offering assistance in selecting appropriate bibliographic indexes via menus. The University of Vermont has a program that aids in identifying proper vocabulary, adjusting search precision and recall, and selecting appropriate search keys. Case Western, in Cleveland, Ohio, has a program that helps the user select the appropriate CD-ROM! All of these are examples of what Columbia University, in New York City, has been doing--changing the technology to suit the needs of the patrons rather than the other way around, i.e., the way online started. While this approach is not easy or inexpensive, it will work. And that is what online is discovering after 16 years--it's a wondrous technology, but it has to adjust if it is ever to reach its potential market.

While expert systems and artificial intelligence work is continuing, there is a cadre of people working on speech recognition. Work at The Massachusetts Institute of Technology (MIT), in Cambridge, reflects the realization that past attempts have been disappointing because they tried to move too far, too fast. Today, MIT feels speech recognition works only if you keep it simple.(4) This effort does not enjoy uniform support. Some at the University of California, San Diego, feel that ". . . good information systems aren't built on technology so much as they are on a solid understanding of user needs, user behavior, and the way people think."(5)

The attempts to reach perceived markets and the appeal of online distribution have enticed newcomers into the online system operator field. Some of these are certainly not new to information. BIOSIS, for example, has introduced its subject specific BIOSIS Connection to the life science community. An online

system with options of both menu and expert levels, the BIOSIS Connection offers specialty databases with a narrow, highly focused appeal. Through the aid of specialty software, the National Library of Medicine is reaching out to the medical community, specifically the doctors--a market that the enormously successful Mead Data Central (with its LEXIS system for lawyers) failed to reach. The American Institute of Physics offers its PHYNET system for physicists; PiNet from Prentice Hall was created to entice those interested in investments. Online systems and the products they offer, because of their high acceptance levels in certain communities and because of their failure to provide affordable services and easy-to-access systems, have been the impetus for the technologies that today are under development or being incorporated into the dissemination process. As in the case of online, the technology predates the use; and information distribution continues to be technology led.

CD-ROM

While online information is well established, CD-ROM is just beginning. Reports are that the industry spawned by this technology has grown from having no titles in 1985 to 450 in 1989. This technology has its advocates and its skeptics; each camp has justifiable reason for its position. If one compares CD-ROM to the printing model for success, one can easily see both views.

The economics of CD-ROM are good; this technology has the potential of having all the positive alternatives to the negatives offered by online. For those who appreciate the value of information and recognize their need for information, online-like searching power for a one-time fee that frequently is lower than the subscription price for a print counterpart is appealing. The capabilities overshadow the expenses required to purchase a CD-ROM drive and the personal computer to complete the set up.

The fact that hardware is required to use this technology, however, puts it at the same distribution disadvantage as online in its early years. Businesses and individuals simply don't have this equipment on hand. In fact, some reports say that only 218,000 drives will have been installed by the end of 1989.(6)

If CD-ROM takes advantage of what the online industry has built, a market already established and information literate, use of a CD-ROM is no barrier. If, on the otherhand, the purveyors of CD-ROM intend for this technology to open new markets, they will face the same literacy challenge that online faced. Although the economics are favorable, they are substantial if one has not been conditioned by online. The timing of the introduction of this technology, likewise, depends on which market is the primary target--overextended online users or those who decided they couldn't afford CD-ROM might be prime for the technology. The others are not.

When looking at the CD-ROM industry in North America, we must accept that this is a technology that is looking for a market. It is trying to lure both customers and suppliers of information--the technology medium without the data is worthless.

There are some who feel the CD-ROM industry is THE industry of today. It has its own association; it has at least two well-conceived newsletters devoted to the technology; it has its own conferences and accounts for many of the presentations made at other meetings. CD-ROM, it is felt, provides both opportunities and threats to the distributors of computerized databases. The opportunity comes with the promise of lower distribution costs than with online--that is, suppliers of online database services can see as much as 80% of their gross revenues go to telecommunications fees while disc mastering/materials average not much more than $15/disc.(7) Initial CD-ROM products are being improved; new players are entering the market; the hardware is being upgraded; the distribution methods are increasing.

The Products

Creative CD-ROM products include two from Microsoft--Bookshelf, a dictionary, thesaurus, and style guide combination and the Microsoft Small Business Consultant that offers 220 plus government publications to help small business operations run smoothly. The latter disc costs only $149--less than one half of what the print counterparts would cost to acquire. The Oxford English Dictionary, produced by ICC, has the entire product on one disc. The Books in Print CD-ROM includes ordering capabilities. ISI's SciSearch CD-ROM has a co-citation searching feature that is not possible either online or with the print.

University Microfilm's Periodical Abstracts OnDisc includes all of the Reader's Guide titles plus 100 more, going back to January, 1988. Users can obtain the full text of these titles from UMI. This product is designed so that it can be paired with other UMI CD-ROMs--they all use the same search software so users can move from one to the other without re-entering search terms to perform the same search. A spin-off product is Resource One, created for the smaller library. It indexes 130 of the most frequently used general-interest periodicals.

Traditional publishers were among the first to offer their products on CD-ROM. That they have been joined by the likes of Microsoft speaks to the impact of technology. Another sign that the technology is being taken seriously is the interest companies like Dialog have shown. The Dialog OnDisc product line is fully established, now, and enthusiastically promoted.

The Hardware

The original CD-ROM hardware configurations are also being modified in the early stages of this industry. Originally, and some say still, the information provider really also had to provide the hardware in the sale. This is particularly true when more than one CD-ROM is needed for a single title--Medline--or when more than one CD-ROM is offered by the same company. Cambridge Scientific, for example, because it offers Medline on four discs, has had a multi-disc drive designed by Hitachi and includes that in its package. At the moment it can be used only with Medline, and the search results for the discs display separately even though all four discs are searched simultaneously. Information Access Company (IAC) has, from the beginning, coupled the hardware and the software and, recently, bundled all the disc access with online access for the most up-to-date information.

One of the biggest complaints about CD-ROM has been the one disc/one computer access set up. That appears to be on its way to solution. SilverPlatter is moving ahead with MultiPlatter, a stand alone CD-ROM network linking more than one workstation to multiple CD-ROM drives. This is a rare example of responding with technology to a market need rather than creating a market because of a technology.

The prospect of this configuration and access via Local Area Networks (LANs) has made some producers rewrite their license agreements. PsycINFO, producer of the PsycLIT CD-ROM, has a new lease agreement with local area network permission and new pricing scheme for up to eight simultaneous users. The cost is 50% higher than the single disc license price.

The Distribution

Distribution and sales outlets for the technology are also changing. CD-ROMs are appearing at the retail level. Ziff-Davis Computer Library and Microsoft's Program Library can be found at leading computer, software, and book stores. CD-ROM drives are available at retail computer stores. This point-of-purchase type of distribution, rarely available and generally unsuccessful for online products, will increase public awareness even if it doesn't increase sales.

The Markets

Another difference in the path that the CD-ROM technology is following is found in the markets for which the products are being targeted. Relatively few of the 450 titles available by the end of 1989 will be for use in the horizontal market of information aficionados, regardless of their discipline. While Microsoft's Bookshelf, Bowker's Books in Print, and the various directories make headlines, more often than not the CD-ROM is being targeted to a well-defined vertical market such as the IBM disc for the insurance industry mentioned above. From the beginning, vertical markets have been important. Two years ago, in addition to the A&I products for the libraries, financial and medical markets were targeted. Next came the U.S. federal government, the military, the legal areas. Now discs serving architecture, construction, airlines, engineering, and science are being introduced.

A Success?

It has been said that CD-ROM sales will depend on the degree to which any vertical market suffers from inefficiencies or costs of acquiring and using data distributed on paper; tendencies of vendors supplying that market to move to CD-ROM; how soon and how well such products are designed and delivered.(8) An International Research Development Report has estimated that the CD-ROM market will exceed $1 billion by 1991, and it will do so by appealing to the business markets not the consumer markets.(9) Given that 1991 is only two years away and that research reports can offer spectacular projections, this may not come to pass; but the trend to appeal to narrow sectors is firmly established.

Another observation about successful CD-ROM products is that they appear to offer value. In some cases, that appearance is only a facade--same doll, new clothes. In a refreshing number of cases, however, the producer is, in fact, using the technology to offer a new, enhanced product or a product that would be impossible to offer in another, more traditional medium. Combination products, such as those from MicroSoft, are a true example of value added. Combining text and images is another method of taking advantage of the technology. The National Agricultural Library is investigating technological applications for visual and textual knowledge in agriculture. Its system allows easy retrieval multiple access points, easy ordering, reduction of the physical handling of valuable photographs, reduction in travel costs associated with photo research.

The Future

A recent CD-ROM convention had as its title, The Future Is Now! That may or may not be true--most of its sessions were very practical, focusing on basic approaches to the topic. There were no talks on attracting a market, no comparisons of like offerings, no visions of where the industry will go. It showed all the signs of a young industry--geared for those who may well be thinking about getting into CD-ROM but are not yet there.

There will be, of course, a future. What might be expected? There are those who feel that CD-ROM is a revolution that will change how information is stored, retrieved, distributed, utilized--a technology that can be used to display photo and art collections and other rare and fragile materials. Will end users really flock to this technology? With current prices, it is doubtful they will buy it for themselves. It is, however, quite likely that they will use it increasingly when LAN environments become readily available.

What will be the effect on the library and the ways it now can access/distribute information? There have been articles that show a precipitous decline in online usage for databases available on CD-ROM. Others are saying that CD-ROM availability does not affect their online usage because a "different brand" of person is using the CD-ROM--not the ones who would use online. Still others have said that the current analysis is concentrating on CD-ROM vs print subscriptions--CD-ROMs, after all, save space; and shelf space is at a premium in most libraries. The real impact of CD-ROM on online usage will probably be more measurable when the highly popular databases, currently not available, sign on with the technology and when the LAN or multiple site environments become the norm rather than the exception. At that point, libraries will be offering what amounts to a mini-online system; it will then be an ideal place to judge just how important currency and the other online advantages CD-ROM doesn't offer really are.

What will be happening on the supplier side? There will be increased competition in the markets for the drives, in search/retrieval software, in mastering/replicating services and CD-ROM authoring systems, and among vendors offering similar/identical data. Some of this, of course, is going on now particularly in the area of creation. CD-ROM Image System from Knowledge Access International stores and retrieves large databases and can combine text and images. CD premastering and mastering services are offered as well as packaging. There are many other organizations like Knowledge Access; and there will be more, if the market becomes the lucrative and active one being predicted.

Of course these organizations must watch those close on their heels with even newer technologies--Compact Disc-Interactive (CD-I), once given up for dead, seems to be making a return with 25-30 titles available when it appears. Much is being said, little exists to show--another victory for technology. There is Digital Video Interactive (DVI) from an Intel, Microsoft, and IBM cooperative--a similar technology to CD-I but with products geared for the business and educational markets.

The general sense is that the technology will take off, truly be successful, when the number of value-added products increases, when the applications are in place, and IF the products are marketed correctly. One could also add, and IF newer technologies develop along separate paths for separate uses/markets. Since CD-ROM has been the "first," an easy target for newer, fancier, better technologies, it may well go the way of batch processing--all we had until random access disks came on the scene to relegate batch processing to the computer room background forever.

And what of the information providers? Will they embrace the new technology? It is quite obvious now that there are major publishers that have, as yet, been deaf to the siren's call. Some wonder if there is really a user base large enough to support a CD-ROM product in their product line, i.e., support in such a way that any loss in print subscription revenues or in online usage will be made up by the sales of the CD-ROM.

This uncertainty, for many, grows out of their experience with online--print subscriptions decreased; migration to online was real. This also leads naturally to the uncertainty about pricing a CD-ROM. If disc production means the loss of cumulative indexes that contribute substantially to the bottom line, can a disc be priced in such a way to make up that loss and, at the same time, be attractive to the buyer? Production, distribution, and support cost money. Even though production costs are coming down, will the sales support these extra, inevitable expenses? The technology is too new, the market too small and maldefined, at this point, for some producers to take the risk.

GATEWAYS AND VIDEOTEX

A third area of information distribution receiving significant press in North America is the gateway or videotex service. While it is obvious that without a sound telecommunications infrastructure the concept of gatewaying could not successfully exist, gateways and particularly videotex have actually been the result of circumstances and events as much outside the information industry as within.

Traditional Gateways

Gateways can differ tremendously in what they offer; however, the basic premise of a gateway is the ability to connect a searcher of one service to another. They can attribute their existence to both the successes and failures of the online industry.

The success of online led to the introduction of many different services offering, collectively, access to virtually all types information. The fallacy, however, was that each of these services required the customer to use its own search protocol. Each also had its own contract; each sent out its own billing. Those individual requirements soon made it impossible for even the professional information searcher to keep up with the variety or to hope to maintain any amount of competency on the systems. Gateways, by offering access via one system to another, solved some of the problems caused by overabundance. They filled a need, came at the right time, and had an economic advantage. While their use is not enormous, their acceptance is assured.

Finding the Niche

The big failure, to date, of online information the United States is reaching the professional, the end user, the ultimate customer. The complicated, technical search protocols, the hardware and contractual requirements, the sheer number of system possibilities have made online access unattractive for these potential users. The online industry needed, it seemed, the kind of gateway that was a front end to multiple systems--requiring very little in the way of expertise on the part of the consumer. The best example of this type of gateway is EasyNet, from Telebase.

Telebase envisioned EasyNet as the service that would reach the end user, that enormous market of people with personal computers AND modems who appreciated the value of information and needed information, but only on a periodic basis. The rationale seemed flawless. The reality is that those end users, as a universe, defied identification, making them virtually impossible to reach. In addition, while they are obviously information consumers, as any of us is, they are not accustomed to paying for it--even if the fees are simply constructed. Telebase failed, therefore, as an "everyman" system. Only when Telebase began to contract with remarketers--organizations that promoted the service to small, identifiable segments of the end user market with which they were familiar because of their other business activities--did the concept begin to seem financially viable.

Niche gateways, then, seem to generate more interest and have more credibility than generic ones. ABA/NET Gateway, via iNet, is a service offered by the American Bar Association for its members. It includes its own databases--AMBAR, abstracts of legal products, periodicals--but also connects to Mead's LEXIS system and the Westlaw legal system from West Publishing as well as the more generic commercial services of Dialog, VuText, BRS, CompuServe, Questel, etc. BIOSIS, with its BIOSIS Connection, is investigating gatewaying with commercial services to offer its life science market access beyond the specialty databases it has on its own new system.

The RBOCs

While there is activity in the niche market area and in the more traditional information industry segments, the real news comes from the Regional Bell Operating Companies (RBOCs). To understand what is happening in this area, a look at the past is imperative. In January, 1984, U.S. Federal Court Judge Harold Greene ruled that American Telephone and Telegraph (AT&T) must be broken up--it was a telecommunications monopoly.

The result of his ruling was a much smaller AT&T, providing lines and long distance service, and seven regional companies that would provide phone service to their localized geographic areas. These seven companies are the RBOCs--or Baby Bells as they were fondly dubbed. The RBOCs had a limited mandate, however. They were forbidden to enter the areas of equipment manufacturing, information services, and long distance. It has been five years since the ruling, and the RBOCs are still trying to expand their permitted scope of business. Only minor advances in their services have appeared--options like speed dialing, call waiting, etc., none of which has been particularly well received.

Minitel Model

One path they could pursue, however, was gatewaying--a step Judge Greene encouraged. Paramount in his decision was his awareness of the Minitel System in France--he was impressed and believed that a similar service should be available in the United States. What seems to have been overlooked by Judge Greene, in his enthusiasm, and by the RBOCs, in their desire to develop new services/open new revenue streams, is that Minitel worked in France for some unique reasons: it was the best means for providing directory assistance, and its distribution was initially heavily subsidized. Directory assistance in the United States is superb--and little subsidy for the necessary hardware has even been considered. The likelihood that a Minitel-type system will enjoy early or eventual success in the United States, because of the information it makes available, is small.

The American consumer wants (or might want) entertainment. The American consumer is beginning to use shopping services on television, so electronic shopping is not far afield. The American consumer is not interested in technology. As Gerald Bennington, President, X-PRESS Information Services, Ltd. has said, "Product is key not technology."(10)

Gateway Becomes Videotex

In spite of the naysayers, the RBOCs are pursuing the gateway course. Six of the seven have announced plans to offer gateway services (many of the RBOCs are calling them videotex services as well--the distinction between the two seems to be blurring when one is speaking about services from the Baby Bells); two, Bell Atlantic and Bell South, have test gateways operating now.

The Bell Atlantic system, Information Gateway, requires that the customer have only a Bell calling card. There is no monthly subscription fee--no charge to look--no billing until used. The databases include Pennsylvania demographics and statistics, updates on financial information, legislative and regulatory tracking. In other words, it is highly specific to the geographic area--so specific, that it is unclear exactly who will be interested.

Probably recognizing the narrow scope of information their gateways are providing, Bell Atlantic and the other RBOCs are asking providers of more traditional information products to join their services. The response has not been entirely positive. Richard Anderson, Jr., Vice President, Corporate Information Service for Mead Data Central, said, "RBOC participation in information services is unfair, since they can control placement on menus and be privy to demographic information about the customer...Since each of seven RBOCs has a different network plan and different state regulations, a company would literally face seven sets of rules if it were going to work with them." (11)

A New Service Industry

To fill the need expressed by Anderson, Minitel U.S. is now offering Bell Operating Company User Access Service. It will be the middleman, the negotiator, between information services and the RBOC gateways. Businesses, therefore, do not have to list themselves or handle applications, settlements, and administrative chores with each RBOC. Minitel will handle network and application settlements across all networks, negotiate and manage directory listings, routing, usage tracking, and reporting revenue settlements. The client business will receive only a monthly statement of user traffic and a single payment.

And there is more. Minitel terminals will be distributed in addition to software that enables personal computers to access the service. For an additional fee ($1000/month), the client can also be listed on the French Minitel. At present, both Southwestern Bell and Bell South are reported to have signed up for the basic service.

Minitel U.S. is also in the gateway--or videotex network--business. In October, 1988, MSC was formed by Infonet and Minitel USA to operate a domestic and international network so that personal computer owners can access American, French, and Canadian information services by phoning and using a credit card. There are no signup charges, and the necessary software is free. There are 1,500 services available, of which 50% are local in nature (ticket buying, etc.). This enterprise offers the only authorized access to the French kiosk service

Where Is It Going?

Whether the technology is called a gateway or videotex, the basic description and the recipe for success seem the same. Two years ago the Videotex Association conducted a study--were gateways (was videotex) viable?(12) The study predicted that by the year 2000, 97% of North America will have access to videotex (these are people who will have access to a voice dial telecommunications line). Of that number, 50% will be using videotex on an occasional basis in either their offices, homes, or public places.

The technology will be accepted and used because the content will be attractive, i.e., of interest; access will be simple; billing mechanisms will be in place to permit spontaneous access, nonsubscription use; access to services requiring presale subscriptions will be available; system use will be intuitive requiring few instructions; and access will be available through a consistent, easy-to-use mechanism--a gateway.

The gateway is viewed as the traffic facilitator not an integrator or repackager of services from a variety of providers. It can provide a range of functions, meeting the needs of both users and information or service providers, and can include expanded services that will be optional. The traffic is facilitated by a directory of what is available and simple, uniform access to the services. Optimally, gateways should offer multilingual support and translation, multiple media delivery, including full motion video or voice to text translation.

Gateways will have access to user statistics for their own business purposes and perhaps would provide usage statistics and name/address data to the information provider if such information were not blocked by the customer. Gateways, would not be responsible for or impose any content or format restrictions nor would they be responsible for the actions of the users.

This study, as described above, paints a rather rosy future that will require ambitious planning. What is clear, however, is that the videotex industry does support the concept of universal availability in the United States. It has reached consensus on billing, session management, and implementation. It also recognizes that there are substantial barriers--high fees, hardware acquisition costs, time/effort to learn new skills, difficulty of changing behavior. In other countries, when these barriers have been lowered, the system has worked. When value is added, the system has worked. The study concludes that, although some functions may depend on technological developments, technology, itself, should not define the functions. As has been said earlier, needs first--technology second.

OTHER PRODUCTS AND TECHNOLOGIES

The information scene in North America doesn't end with the RBOCs and their gateway/videotex aspirations. A few more products and technologies deserve to be mentioned.

More Videotex

Videotex, as a technology, gained considerable credibility when IBM and Sears entered into a joint venture to offer Prodigy--a consumer videotex service that is being heavily promoted in a few carefully selected areas like the San Francisco Bay Area, also known as Silicon Valley. For $9.95 a month, consumers can make travel arrangements, shop, receive financial news from Dow Jones, etc. The price is certainly right; the package is attractively presented; big corporate names are behind it. Its success will depend, of course, on the viability of the concept that end users want this type of service. It will also depend on Prodigy being a good product. Early reviews were less than favorable--not as easy to use as advertised; too many dead ends in the menu searching; too many shopping opportunities that were unavailable in certain markets; too many telephone drops. (Americans, at least, are not very tolerant of faulty telecommunications or "All Ports Busy" messages!) Prodigy says that 60,000 households are subscribing--it has been estimated that it needs, however, millions of households to break even.

Even newer is a unit from Ameritech, Ameritech Audiotex Services. Ameritech, one of the seven Regional Bell Operating Companies, based in Chicago, is offering voice storage and voice gateways to information providers. With this service, the caller dials a number and selects from a menu of voice programs. Southwestern Bell also has such a service--Quicksource, an audiotex gateway with 90 programs currently available.

E-Mail

Electronic mail, probably more correctly classified as an offshoot of a technology, is available on virtually every online or timesharing system that reaches a searcher. While E-mail has been around for years, the time for it is perfect now given the poor postal delivery service most parts of North America experience. Generic E-mail, however, has one major problem--the individual systems are in no way connected so that you must know on which system the person with whom you wish to communicate has a mail box. If that system doesn't happen to be your own, you are in the multiple system syndrome of online--counterproductive to the success of the service. E-mail works well when it follows the path that may see CD-ROM to its success--in a vertical market environment in which the people have something more in common than a password to the same system and, therefore, quite likely have business or avocational interests in common as well.

That E-mail is coming of age in these selected environments is well illustrated by two services. GE (General Electric) Information Services has a new E-mail feature through which tax preparers can transmit tax returns. The service also offers bulletin boards, full text database services, and an electronic magazine with tax tips. ABA/NET, mentioned previously, offers the legal community the ability to E-mail to FAX machines or to send messages on their own letterhead. The training for this system, by the way, is via telephone rather than in a class. It has also just been announced that the X.400 Application Program Interface Association has published a proposal for a common method of exchanging messages among E-mail systems. When this technology is fully available, one of the major roadblocks to the success of E-mail will be removed.

Hypertext

No overview of technology today would be complete without a mention of hypertext or any of its similarly named relatives. The term hypertext was coined in the 1960s by Ted Nelson, now with Brown University, in Rhode Island. It is a linking of knowledge with all of its intellectual antecedents; that is, concepts are dynamically linked so that the scope of a topic is no longer defined by anyone but the user. The full material cited in a footnote, for example, can be appended. Pictures, sounds, text can be instantly retrieved. Since hypertext reduces the distinction between the index and the item indexed, it is perfect for merging complementary products into one medium. Most of the work on hypertext has been in the universities--driven by scholars. Early work at Stanford and Brown Universities and the University of Maryland led to the prototypes available today. More recently, Appie Computer came out with Hypercard. Even more recently, IBM has announced Hyperpad.

While the commercial applications are very few, there are problems with hypertext. One is that it is easy to get lost in what has been named "hyperspace." Using a product with no marking, no index, no underlining represents a nonsequential learning pattern, which is something we are not used to.(13) And, as with too many new technologies that companies are vying to use, the lack of standards presents ongoing problems. When asked if hypertext is the answer to the interface question, opinions will range from absolutely--"a window onto the future of information systems"--to absolutely not--"a hoax perpetrated on the most gullible among us!"(14)

There are, nevertheless, a few applications of hypertext that have received high marks. One is the CD-ROM product from West Publishing, which integrates legal research and the legal drafting process. The three CDs, on government contracts, include a reference tool (Government Contracts Library Law Finder), statutes from selected U.S. Code sections, regulations from sources including Code of Federal Regulations, and sources of case and administrative law. The variety of text material can be accessed with online Boolean techniques as well as hypertext mapping technology. A word processing capability is also included in what has been rated as an excellent use of technology. Another CD-ROM product due for introduction is the Social Science Citation Index (from the Institute for Scientific Information, ISI) that allows searching of words, citations, authors, journal titles, etc. and includes a hypertext function that allows searching of related records, i.e., those papers that share a common set of references.

CONCLUSION

Is technology becoming its own worst enemy? At a LITA (Library and Information Technology Association, a part of the American Library Association) meeting last year, the keynote speaker noted that the current methods of information storage and delivery are "fraying around the edges" and showing early signs of obsolescence. These signs include the mass of nontext information that is not being effectively integrated into the system; the struggle of the existing legal and regulatory institutions to deal with the new technology; the decreased reliance by researchers on formal publication; the increasing number of specialized disparate databases; and a growing sense of information overload, to the point where it won't be able to absorb any more information--"the equivalent of a knowledge grid-lock."(15)

Somehow, it is doubtful that the situation is actually that hopeless...rarely, it seems, does a new technology easily win over converts. It was true for online information; it is still partially true for CD-ROM; it is true within gateways and videotex, at least among the consumer (i.e., end user) markets they are hoping to reach; and it looks like it will be true for hypertext. If, however, printing and online are good examples of what can happen when a technology comes of age, the next ten years will see major developments and market penetration of CD-ROM, gateways and videotex, and hypertext. It will be an exciting decade.

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TECHNOLOGIES FOR ELECTRONIC TRANSFER OF INFORMATION
THE PRESENT STATE AND TRENDS IN JAPAN

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0. Introduction

Japan has become one of the most important sources of scientific and technical information. To control the ever increasing amount of information, Japan provides secondary and tertiary information besides the original information, often in form of databases. The use of electronic media however is hampered by the fact, that Japanese texts contain many thousand different characters, a number which requires special means for input. Many thousand different characters, "Kanji", with their complicated patterns require a huge pattern memory, a high resolution screen respectively a high resolution dot printer for output. In recent years due to the progress in VLSI design, cheap Japanese word processors have appeared, but input of Kanji texts into the computer will always be more expensive than input of alphabetic scripts. The internal coding of the large number of characters led to various different solutions, which made the exchange of Sino-Japanese information between different computer systems impossible until a standard as Japan Industrial Standard JIS C 6226 was devised in 1978. The standard was revised in 1983 and after the information industry became an extra field in JIS it was renamed JIS X 0208. Now even standards for Kanji patterns are available (JIS X 9052-1983 for 24 x 24 dot patterns and JIS X 9051-1984 for 16 x 16 dot patterns). Due to all these difficulties, online systems in Japan with bibliographic information started just ten years ago, but they are now expanding rapidly. For example, all large newspaper companies now have newspaper full text databases in Japanese ready for use.

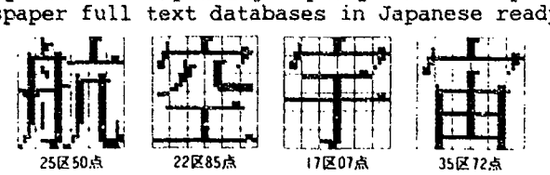


Fig. 1 Kanji pattern (24 x 24 dot) "Air & Space"

Computerized information services with color and graphic capabilities such as Videotex (service name in Japan "CAPTAIN") where introduced some years ago, but did not do as well as expected. One simple reason is the fact, that there are well established "Old Media" in Japan such as television and newspapers. In addition the TV screen is not very well suited for output of longer texts, diminishing the value of the system for obtaining scientific information. Nevertheless, there are intentions to connect scientific information centers with their databases to the CAPTAIN System.

There are various organizations involved in coordinating information and documentation in Japan. As a part of the executive, the *National Diet Library (NDL)*, modeled after the Library of Congress, keeps track of Japanese publications. The *Ministry of Education, Science and Culture (MESC)* is responsible for scientific information for its universities, attached research facilities and its national research facilities. The *Science and Technology Agency (STA)*, a quasi ministry within the Prime Minister's Office, has coordination functions in science and technology, including scientific information. The *Ministry of International Trade and Industry (MITI)* is in charge of patent information and the private information sector, for which it established the Database Promotion Center. Finally, the Ministry of Posts and Telecommunication (MPT) has always shown great interest in databases etc. as a field of growing use of telecommunication systems. The general carrier NTT (Nippon Telegraph and Telephone) runs a database retrieval system within its computing services, a system which is used by many private database providers. The new telecommunication technology provided by an internationally standardized ISDN will improve the information flow all over the world.

There is some overlap in the information activities between these governmental agencies, but governed by a 'Japanese' balance between competition and cooperation. Main institutions in the field of scientific and technical information, besides the NDL are the *Japan Information Center of Science and Technology (JICST)*, the *National Information Center of Science Information System (NACSIS)* and the *Japan Patent Information Organization (JAPIO)*, all three are expanding their facilities and services. Establishing a firm base at home and internationalization are two trends, which can be observed. JICST opened its online system JOIS to users abroad in 1984, joint STN International and opened its STN-node at the end of 1987. NACSIS has started to connect its system to overseas countries, the first partner to be the American National Science Foundation, which was connected by a leased line at the beginning of 1989. An other line to the British Library will follow next. JAPIO traditionally is integrated in international cooperation with INPADOC at Vienna as a general host.

One problem not solved by the new possibilities of access is the language barrier. Japan is making efforts to provide information in English, but a knowledge of Japanese in western countries will be useful today and will be necessary in future: the amount of Japanese information is growing so fast, that the amount, which can be translated in time will inevitably drop. The help of machine translation should not be over estimat-

ed. Another point which has to be made concerns *formal* and *informal* information. Computerization has made much progress, and electronically stored Japanese information can be retrieved from all over the world. But even future systems will not store all important information. So informal communication between people will always remain very important.

Information activities in Japan were described already on several occasions, e.g. by B. Marx (1). A quite complete recent survey on databases of interest to foreigners is given in (2). Scientific *fact* databases, which require very special terminals and very special knowledge are described recently by S. Iwata (3) and A. Guidi (4). A broad discussion on topics related to Japanese information can be found in the conference papers of the 'International Conference on Japanese Information in Science, Technology and Commerce' (5). In this paper the following three sections will give an outline on Japanese information activities, which may be of interest to researchers, especially in the field of science and technology. All institutions mentioned in this paper are publishing regular outlines on their activities, which appear also in English. To contact them directly, their addresses are given in the appendix.

2. Electronically stored bibliographic Information

2.1 The Japan Information Center of Science and Technology (JICST)

JICST was founded in 1957 according by a law, in which its purpose is described as follows:

"JICST has, as Japan's central institution in the field of scientific technical information, to contribute by swift and accurate provision of Japanese and foreign Information to the development of Japanese science and technology". And it is further stated: "Scientific and technical information includes all fields of science and technology, except humanities."

JICST has the legal status of a special nonprofit organization (Tokushu Hôjin) and is supervised by the Science and Technology Agency. JICST is financed by subscription and service fees and gets in addition financial governmental support. To achieve its goals, JICST is engaged in the following services:

1. Online Service (JOIS, JOIS-F, STN)
2. Publishing Service of abstract journals in science and technology
3. Copying Service
4. Translation Service
5. SDI and RS Service
6. Other services

JICST maintains a head office in Tokyo, a library (Tokyo), branch offices (from north to south) in Sapporo, Sendai Toyoma, Tsukuba, Tokyo, Nagoya, Osaka, Hiroshima, Takamatsu, Fukuoka. After a developing period, which ended about 1970, JICST can be characterized by the data in Tab. 1.

Tab. 1: JICST

Founded in 1957 Agency in charge: STA Staff 327 persons + 5000 external abstracters Budget 11 billion Yen (1987)

Since the end of 1987, JICST provides three separate online services (1) its own service, called JOIS, which can handle Japanese and foreign databases, (2) JOIS-F, a factual database system and (3) STN, a general information service JICST jointly runs together with Chemical Abstracts Service (US) and FIZ Karlsruhe (Germany). The JOIS online system was JICST's first system and has been provided since 1976. It serves its own databases, which are of course of main interest for foreign users, and well known foreign databases like MEDLARS. There are also a few Japanese databases offered on JOIS not produced by JICST.

Japanese Databases served by JOIS

- JICST File on Science and Technology (since 1975)
  5,6 mi. documents total
  0,7 mi. documents/year increment
- JICST/Med on medical fields in related Japan (since 1981)
  1,1 mi. documents total
- JICST Clearing (Research information) (since 1981)
  50,000 documents total
- JICST Public (Government documents) (since 1983)
  14,000 documents total

- JICST File English on Science & Technology+ Medicine 1985
  51,000 documents total

- NIKKAN KOGYO File (technology, products) since 1983
  95,000 documents total

- JAFIC File (food industry) since 1985
  12,000 documents total

- OSAKA-UE File (Urban engineering in Osaka) since 1970
  5,000 documents total

JOIS-F, the factual database system provides currently two fact databases and the necessary chemical compounds dictionary database. It started its service in 1987 and offers two databases:

- JICST THERMO (Thermophysical and Thermochemical Proper ty database)
- JICST MASS (Mass spectral database)
- JICST DNA (Gene Information)
- JICST Chemical Compounds Dictionary (92,000 entries)

The printed version of the JICST file is called 'The Current Bibliography of Science and Technology' and appears in 11 series with some overlap in contents. The composition can be seen from table 2.

Tab. 2: JICST File (1988)

Field	(1)	(2)
Chemistry and Chemical Industry (Foreign) ..	T	118,653
Chemistry and Chemical Industry (Japan)	M	29,501
Mechanical Engineering	H	92,620
Pure and Applied Physics	H	86,091
Earth Sciences, Mining, Metallurgy	H	66,741
Electronics and Electrical Engineering	H	72,551
Civil Engineering and Architecture	H	53,049
Nuclear Engineering	M	22,911
Management Science and Systems Engineering .	M	49,211
Environment	M	26,591
Energy	M	26,011
Life Science	T	111,536
Total		755,466

(1) Appearance: H = half monthly, M = monthly, T = every 10 days
(2) Number of Abstracts in 1987
(3) Japanese proportion

From earlier studies it is known that the share of information of Japanese origin is 20 % on average and in some special fields nearly 50 %, which is clearly higher then the Japanese share in databases produced in western countries, with have a 'normal' 6-10 %.

Composition of the JICST-File by type of primary documents:
59 % Original papers
24 % Review papers
13 % Original short communications
4 % Others

Online charges are calculated by access-time (about 120 to 200 Yen per minute) and by a hit charge (30 to 45 Yen per item).

Above all, the copying service has to be mentioned. It relies on the following accumulated material:

JICST
7,298 Japanese Journals
11,801 Foreign Journals
14,000 Conference Proceedings
88,000 Papers from Meetings
613,000 Technical Reports

Copies can be ordered online. JICST has shortened its processing time considerably, as shown in Tab. 5. The Copy fee is a 500 Yen basic fee + 60 Yen per page. The copy volume comes to 700.000 documents per year.

Other regular publications for referral use include *Foreign Patent News* (Patents in chemistry), *Technical Highlights* (for medium and small business), *Food Processing*. *In 1982 some services in English were introduced: JICST Abstracts* with the series *Renewable Energy*, *Agro-Industries* and *Science and Technology Research Progress in Japan*. JICST edits a monthly journal *Joho Kanri* (Journal of Information Processing and Manage-

ment), and organizes a yearly symposium on topics related to information and documentation. JICST also gives a yearly reward (*Niwa-Reward*) to persons who have made outstanding contributions to information and documentation.

JICST's National cooperating partners include
- Japan Steel Institute
- Japan Chemical Information Association (JAICI)
- Japan Pharmaceutical Information Center (JAPIC)
- Small Business Promotion Corporation
- Zentralblatt der Medizin
- Tohoku Igaku Joho Center

As far as international cooperation is concerned, JICST has been member of FID since 1957 and of ICSTI (formerly ICSU/AB) since 1973. JICST sends observers to UNISIST, OECD, and IRS. Besides that JICST is involved in the following bilateral relationships:

- US: Cooperation within the framework of the Agreement on Cooperation in Science and Technology
  STN Cooperation with CAS
- Rep. of Korea: Exchange of researchers
- Bulgaria: Information exchange with CISTI
- France: Agreement with CNRS/CDST of mutual support of a liaison office
- Germany : Cooperation with BMFT/GMD at the Panel *In formation and Documentation* within the framework of the Agreement on Cooperation on Science and Technology
  STN Cooperation with FIZ Karlsruhe
- PR China: Exchange of researchers

JICST opened its JOIS system in 1985 to overseas's users and has established contracts with the following agents (Tab. 3).

Access is easily possible through the national packet switching networks, which are connected to the respective Japanese packet switching networks. A terminal or a PC with a terminal program is needed with hardware at least capable of Kana, preferably also Kanji. (Of course, with proper software, Kanji representation is possible independently of specialized hardware on any PC, given some graphic capability.) All Japanese language databases served by JICST are offered through JOIS internationally, including the English translation of that share of the JICST File, which is of Japanese origin.

Tab. 3: JICST's partners for JOIS

Agency (Country)	since
DACOM (Korea)	12/1984
GID/GMD (West Germany)	2/1985
CDST (France)	10/1985
Microinfo (Great Britain)	12/1985
NTIS (USA)	4/1986
JaSTIS (Canada)	11/1986
Aho & Meguro (Finland)	3/1987

Within STN, JICST is accessible through nodes in the US (CAS at Columbus, Ohio) and in West Germany (FIZ Karlsruhe at Karlsruhe) The STN retrieval software *Messenger* however does not handle Kanji for the time being, so the databases of Japanese origin offered through STN are restricted to the JICST File (English).

2.2. The National Center for Science Information System (NACSIS)

NACSIS was founded as a national center under the jurisdiction of the Ministry of Education Science and Culture in 1986, but it dates back more than ten years, starting with a *Research Center for Library and Information Science* at Tokyo University, established 1976. Later there was a transition period, when the center became semi-independent as the *Center for Bibliographic Information* (CBI) from 1983 to 1986.

The activities of NACSIS now comprise the following:

(1) planning activities,
(2) basic research in library science
(3) compilation of union catalogs of scientific journals
(4) Information retrieval service
(5) formation of databases
(6) provision of information utilities
(7) training

The center is open to joint research, it hosts symposia and related activities to strengthen international cooperation. One example was the *International Conference on Scholarly Information Networks* at the end of 1987, where participants from various countries discussed problems of processing bibliographic information written in Chinese, Japanese and Korean within one and the same system.

Tab. 4: NACSIS (1989)

Founded in 1986, Agency in charge: MESC
Staff 76 persons, including 20 researchers

The center is equipped with a very large scale computer system Hitachi M-680 with 3 attached IDPs (Internal Database Processors) and with a main memory of 3 x 256 MByte. The file memory (Magnetic drums) has a capacity of 320 GByte, supported by a very fast memory (Semiconductor-type) of 512 MByte and a large capacity memory (MSS) of 100 GByte. Optical disc memory and magnetic tape systems complete the memory section. Appropriate peripherals, including a very fast laser printer, training equipment and telecommunication network control systems are installed.

As the union catalogs are concerned, at present, there are the following files

NACSIS Union Catalogue of Japanese Books
247,810 titles - 751,424 holdings (as 1989.3)

NACSIS Union Catalogue of Foreign Books
567,242 titles - 860,226 holdings (as 1989.3)

NACSIS Union Catalogue of Japanese Periodicals
45,483 titles - 1,009,186 holdings (as 1989.3)

NACSIS Union Catalogue of Foreign Periodicals
100,095 titles - 843,074 holdings (as 1989.3)

Together with JAPAN-MARC, TRC MARC, LC MARC these catalogues are provided through the Catalogue Retrieval System.

NACSIS also produces some databases:

(1) Dissertation Abstracts (Japan): 14,000 per year
(2) Abstracts of Reports of Research Grant-in-Aid:
(3) Conference Papers in Electric and Electronic Engineering: 17,000 acc.
(4) Conference Papers in Chemistry: 2,000 acc.

Together with some databases of overseas origin these databases are provided through the Information Retrieval System.

NACSIS is operating a nationwide library network, which will be merged with the existing inter-university computer network to form the *Science Information Network* with dedicated digital lines and NACSIS as the center. The existing seven large-scale computer center with their packet switching facilities will be supplemented by another four packet switching center. Gateway processors will connect the nationwide network with the respective intra campus LAN. In future, the capabilities of this digital network will be used to transmit pictures, full texts etc.

To provide overseas users access to the center, NACSIS is installing a dedicated line (9600 Baud) between Tokyo and the *National Science Foundation (NSF)* at Washington from January, 1989. By this line it will be easy to access to the information stored at NACSIS. Also electronic mail will be possible. Similar links with Europe are also under consideration, starting probably with Great Britain as partner country and followed by Germany, France.

2.3 Japan Patent Information Organization (JAPIO)

The Japanese Patent System was created in 1885. The ever increasing amount of patent information led to the creation of the Japan Patent Information Center in 1971. This center was reorganized in 1985 through incorporation of the service section of the Japan Institute of Invention and Innovation. Besides processing the information of the Patent Office JAPIO serves also as a host for Japanese and foreign patent information. JAPIO is member of WPO and INPADOC.

Tab. 5: JAPIO

Founded in 1985, Agency in charge: MITI
Staff 227 persons
Budget 1.7 billion Yen (1987)

JAPIO comprises the following divisions:

- Planning Office
- Information Service Department
- Publication Department
- System Development Department
- Information Processing Department

- Optical Disk Input Department

JAPIO is engaged in production of the patent official gazette, production of the patent databases, online and batch service. The online system of the Center called PATOLIS provides the following databases of Japanese origin:

Kind of Document	DATA BASE (in Japanese except INPADOC)	
	Item	Publication Year
Japanese Patent	Bibliographic Data	Jan. 1955 -
	Keyword (Free & Fixed)	July 1971 -
	Short Summary	July 1971 -
	Abstract	Jan. 1977 -
	Drawing	Jan. 1980 -
	File History	Application from Jan. 1964
Japanese Utility Model	Bibliographic Data	Jan. 1960 -
	Keyword (Free & Fixed)	Jan. 1980 -
	Short Summary	Jan. 1980 -
	Drawing	Jan. 1980 -
	File History	Application from Jan. 1964
Japanese Design	Bibliographic Data	Jan. 1965 -
	File History	Application from Jan. 1964
Japanese Trade Mark	Bibliographic Data	Application from Mar. 1902
	Drawing	July 1909 -
	File History	Application from Jan. 1964
PCT Application	Bibliographic Data	Jan. 1979 -
	Summary	Jan. 1979 -
Japanese Trial	File History	Sep. 1982 -
Japanese Registration	File History	Existing rights
Foreign Document (INPADOC)	Bibliographic Data	Jan. 1968 -

Fig. 2: Databases offered by JAPIO

The total number of entries is more than 28 million records. Another database 'Japan Unexamined Patents' in English is provided through Orbit.

The output of graphical information, which is especially useful in patent information, is done by using an existing standard, e.g. facsimile technology. The service started in 1982 as batch service, but it is now also available online. The technical drawings (5 x 7 cm) are scanned and by facsimile methods compressed to about 10 KByte per drawing. They are stored on optical disks. Trade marks and designs are stored in standardized size. So in retrieval the coded information is transmitted coded and the graphic information is added.

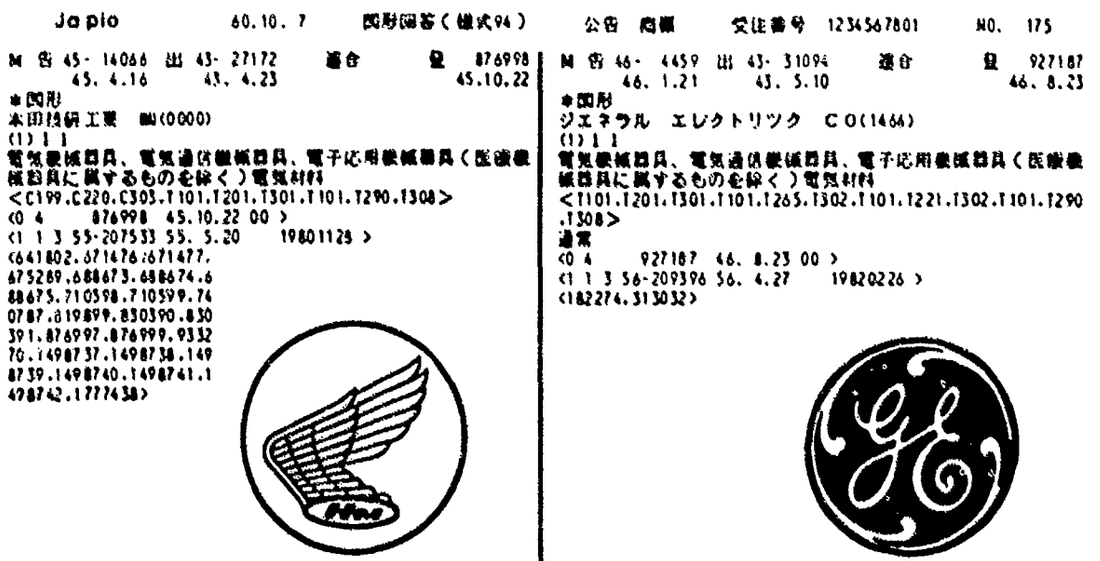


Fig 3: Example of an Output from JAPIO Databases (Graphic)

Instead of the traditional 16 mm microfilm and microfiche, JAPIO now distributes 12 cm CD-ROM including full text image data and index data, such as application and publication numbers, IPC symbol etc. of Japanses unexamined patents and utility models published from 1987. A CD-ROM stores about 2,600 documents (16,000 pages) of patents and 8,800 documents (20,000 pages) of utility models. The CD-ROM are used together with the PATOLIS online system.

In 1983 the three most important patent offices (US Patent Office, European Patent Office, Japan Patent Office) agreed on a joint approach for introducing electronic media for the whole process of application and examination of patents. Beginning in 1984, Japan has planned its electronification within a ten-years framework. One part of the business was to store all old patents on optical disks as an image file, enabling an easy look-up at the terminal installed at the examiners working place.

3. Other Information Activities

3.1 NIKKEI Information Service

Among commercial information providers NIKKEI Information Service is of interest as a source of technical information. Because the information source is built from the various newspapers of the company, 'deep information' cannot be expected, but a very broad range or product information. NIKKEI, the Nihon Keizai Shimbun was founded in 1876 and is today the leading economically oriented newspaper with a daily output of 3 million copies. Stock information service is given by the daughter company QUICK, which serves more than 15.000 terminals. The databank division of NIKKEI has a staff of 100 and is producing the following database services:

NEEDS
About 20 databases with business, marketing and financial information.
Access through NEEDS-NET or through DDX-P

NEEDS-IR
NIKKEI-FILE (Newspaper information)
JOINT (Management information)
Access through DEMOS (NTT)

DEMOS is a computer service by NTT, which offers scientific calculations etc. at many access points throughout Japan. Within DEMOS the database system DORIS is used by many database producers for online service.

3.2 Electronic Library (EL)

The Electronic Library after several years of preparations started its service in 1988. With a file made from 32 newspapers and 200 magazines is one of the largest database in Japan. Bibliographic information can be retrieved by a standard terminal, the newspaper clipping is sent by facsimile (s. Fig 4.) from optical disk storage. The library is backed by more than 70 companies, besides newspaper companies and publishers also printing companies, banks and security bonds companies are engaged in this company. The main investors are Dentsu (one of the world's leading advertising company), NTT, Yomiuri Newspaper company and the Japan Development Bank.

The EL offers five services:

- EL Morning Review (MOR)
  The user registers keywords. 24 leading newspapers are scanned every morning. The appropriate selection is sent between 7 and 10 per fax.

- EK SDI Service
  The user registers keywords. The whole database is scanned. The appropriate selection is sent regularly by mail or fax.

- LD Database
  This is the online service on bibliographic information. With the results, the original texts can be ordered from the full text database.

- EL Press Service
  The user registers keywords. Press releases of the ministries and agencies are scanned every morning. The appropriate selection is sent between 7 and 10 per fax.

- EL News
  The user registers keywords. News of the press agencies scanned every morning. The appropriate selection is sent between 7 and 10 per fax.

Pricing
(1) Registration fee and fee for software: 100,000 Yen per ID
(2) Basic fees per months: 50,000 Yen companies and 50,000 per ID + 50,000 per fast service as EL PRESS or EL NEWS.
(3) Use: 200-400 Yen per item and additional fees

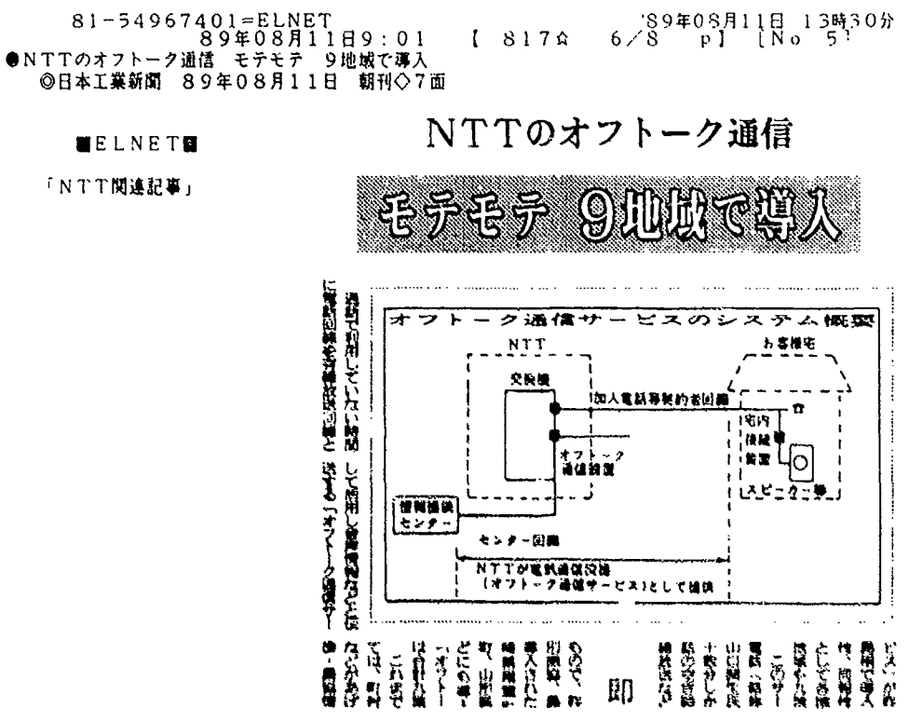
From the pricing it is evidant, that this service is intended for large companies

rather than for every man's use. An other limit is the fact, that in order to have a good transmission quality of the newspaper article, facsimile GIV standard is necessary. Due to the bandwidth it is necessary to use a leased line - until ISDN is general available.

3.3 Nippon Telegraph and Telephone Corporation (NTT)

Telecommunication in Japan was opened to competition some years ago, but the privatisation NTT is still by far the largest common carrier in this country. Data communication business was established as a separate company in 1988. The main line of development is well within the global trend in gradually digitizing information transmission. ISDN (or ISN as it is called in Japan) started last year with the standard 64 KBit x 2 Channel transmission, this year a 64 KBit x 23 system has been added, enabling 1.5 MBit picture transmission. Access points are already available in any larger city.

Examples of recent application developments are: Integrated telephone systems, 'Super Captain', a high resolution remote video (text) system, 'Facemate' a simple, small scale conferencing system with bandwidth from 64 KBit to 384 KBit, broad and video conferencing system,


81-54967401=ELNET '89年08月11日 13時30分 P009
89年08月11日9:01 〔 817☆ 6/8 p〕 〔No 5〕
●NTTのオフトーク通信 モテモテ 9地域で導入
◎日本工業新聞 89年08月11日 朝刊◇7面

■ELNET■

「NTT関連記事」

NTTのオフトーク通信

モテモテ 9地域で導入

オフトーク通信サービスのシステム概要

NTT

交換機

加入電話等契約者回線

オフトーク通信装置

センター回線

NTTが電気通信役務（オフトーク通信サービス）として提供

Fig. 4 Sample output on GIV Fax of NTT related news.

4. Conclusion

After having solved the specific problems in using computers for processing of textual Japanese information, Japan has emerged as the second largest database producer in the world. In many cases, its electronically stored information in English can be accessed from all over the world, in other cases it can be accessed only by terminals with the capability of handling Japanese information. But the trend of internationalization is evident from figures of the 'Database White Paper' (6). Several companies are listed which went international racently. Though theses companies mainly provide business information, also in the field of science and technology the situation will improve also. Another direct contribution of Japan will be the information technology itself. Japan is the second largest producer in this field and will be able to offer low priced technology especially for pictural information processing. So flow of information and flow of information technology will be interdependent even more in future.

Appendix: Addresses or the organizations mentioned

Electronic Library (EL)
Collins 8 Bldg, Tel.: (03) 779-1211
Nishi-Gotanda 8-11-13
Shinagawa-Ku
Tokyo

Private company
-> *Newpaper information per fax*

Japan Information Center of Science and Technology (JICST)
Nagata-cho 2-5-2, Tel.: (03) 581-6411
Chiyoda-ku
Tokyo 100

Center under the Science and Technology Agency.
-> *various scientific databases online*

Japan Patent Information Organization (JAPIO)
Shoko & Benrishi Kaikan
Kasumigaseki 3-4-2, Tel.: (03) 503-2351
Chiyoda-ku
Tokyo 100

Responsible for patent information processing,
related to the Patent Office.
-> *various patent databases online*

National Center for Science Information System (NACSIS)
Otsuka 3-29-1, Tel.: (03) 942-2351, Fax.: (03) 942-2919
Bunkyo-ku
Tokyo 112

Center under the Ministry of Education, Sciences & Culture
-> *Union catalogs on periodicals etc. online*

National Diet Library (NDL)
Nagata-cho 1-10-1, Tel.: (03) 581-2331, Fax: (03) 581-0989
Chiyoda-ku
Tokyo 100

Library under the Diet (Parliament)
-> *Producer of JAPAN MARC, referral tools*

Nippon Telegraph and Telephone Co. (NTT)
Uchisaiwaicho 1-2-1
Chiyoda-Ku
Tokyo 100

Common telecommunication carrier
-> *various tlecom & information processing services*

STN International
c/o Fachinformationszentrum Karlsruhe
Tel.: 07247-808-0 Fax: 07247-808-666
7514 Eggenstein-Leopoldshafen 2

Non profit information center (Fed Min. Res. and Technology)
-> Access point for JICST English language databases

Literature:

(1) Marx, B.: Banques de donnees scientifiques et techniques au Japon
in: Le Progres Technique, No. 27 (1982), 19-24

(2) EC-Japan Centre for Industrial Cooperation Center (Ed.): Directory of Sources of Japanese Information.
Tokyo: 1989

(3) Iwata, S.: Materials Data Activities in Japan.

in: Metaux, Corrosion, Industrie (1988) No 753-754

(4) Guidi, A.: Les Bases Donnees Facutelles 'Materiaux' au Japan: Apercu des Realisations en cours.
CNRS/INIST Bureau Tokyo 1988.12.27

(4) British Library (Ed.): International Conference on Japanese Information in Science, Technology and Commerce. Preprints.
London: 1987

(5) Japan Spec. Lib. Ass. (Ed.): Directory of Information Sources in Japan 1986
Tokyo: Nichigai Ass. 1986

(6) Database Promotion Center (Ed.): Database White Paper (in Japanese)
Tokyo: 1989

Address of the Autnor:

GMD Bureau Tokyo
Deutsches Kulturzentrum
Akasaka 7-5-56

Tel.: (00813)-586-7104, Fax: (00813)-586-7187
Mailbox: Dialcom 14:GMD001

INNOVATIONS IN TELECOMMUNICATIONS NETWORKS

by

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A CARRIER'S ROLE IN IT

1 A public telecomms carrier has 6 main roles in the IT marketplace

- a user. BT represents 12% of the UK's IT consumption
- a vendor of telecommunications networks for voice, data and information services (both public and private)
- a vendor of components of IT systems, personal computers, UNIX machines, multiplexes, modems, etc.
- a systems integrator offering complete customer solutions with adaptive engineering to meet specific customer needs
- a conformance tester
- a standards maker

The paper will look briefly at the major innovations in the first 3 of these roles in the field of Electronic Transfer of information. Inevitably it is biased towards the activities of the company but where appropriate the national and international linkages are explored.

BT THE USER

2 BT has five major internal initiatives which might be of interest to this audience. These are: -

2.1 INTERNET/COAST - A conjunction of X.25 WAN with proprietary protocol support, LAN terminal concentration, Terminal emulation, UNIX office automation. £500 million investment over the next 2 years. It also signifies a move away from the large centralised machines to a distributed processing environment so allowing price performance competition for the processors.

2.2 INTERMAIL - Corporate X.400 messaging. Public service and private domain products plus some proprietary extensions. It will be integrated with the UNIX OA in INTERNET.

2.3 INTERVIEW - Corporate X.500 directory for all staff. Linked to INTERMAIL. Linked to an Electronic publishing package to create the vast array of paper directories used within the business. Linked to the BT internal operators for telephone enquiries and offering an SQL interface to provide more elaborate search and retrieval facilities.

2.4 MULTIVENDOR OSI INITIATIVE - BT is working with its major suppliers in a collaborative effort to get 7 layer OSI standards working in the BT infrastructure. The initial phase of this should link ICL and IBM for the exchange and manipulation of itemised billing records before the end of 1989. DEC and AMLAHL are also involved.

2.5 COLLABORATION WITH EUROPEAN PTTs Dr J Spackman has called together the IT directors of the European PTTs with the intention of extending BT's internal commitment to open systems to other European PTTs. Typical of their activities is the ambition to introduce the use of EDIFACT over X.400 for the settle of international accounts between the PTTs. This collaboration should lead to extended customer facilities in time.

In addition to these major initiatives there is the actual (impending) legal and regulatory framework being established by the CEC (the services Directive and the Telecomms Directive) and by the UK Government.

BT THE VENDOR

The Regulator and competition will ensure that BT's income from the domestic market will not grow as fast as BT would wish. To achieve the desired growth BT must extend its activities internationally. Traditional fixed networks with the need to negotiate wayleaves and the implied conflicts with other PTTs are not a favourable vehicle for this internationalisation. Value added networks and mobile communications are the chosen path, as is evidenced by the acquisition of Dialcom (with 23 licensees worldwide), 22% of McCaw and more recently Tymnet. The priorities will be Networking, Management and Value Added Services.

3 The major portfolios are Messaging, Networking and Management. There follows a brief review of each of these and some of the broader trends which can be observed.

4 The BT messaging portfolio includes

4.1 The Dialcom Public Services available in 23 countries and with 400,000 users. Dialcom UK also incorporates the Videotex operation. Prestel. Dialcom UK have had a public X.400 (ADMD) service available from 1st July 1988. Tymnet will add to this international capability.

4.2 BT has Private Management Domain (PRMD) software currently available in Prime, UNIX, VMS and DOS environments. All these products interwork with one another and with the Dialcom ADMD service offering.

4.3 BT was prime contractor in a CEC contract to provide pan European conformance test services for X.400. There has been a phased implementation of this service commencing

in the Summer of 1988 with the final version available in March this year. BT also has intelligent protocol monitor products for X.400 (and most other mature OSI applications).

4.4 BT has been and will continue to be an active participant in the standards process. Much attention this year will be devoted to the start of the new CCITT study period and the industry MHS Application Programming Interface Committee.

This commitment to X.400 messaging is of limited appeal to the end user. Much energy is now being devoted to applications of X.400 to real user needs. These include Electronic Data Interchange (EDIfact) Office Document Architecture (ODA. ISO 8613 CCITT.T502), formatted messaging activities and user interface architectures. Also of interest is the move towards the connection of these value added services to those of other operators. The pace of this interconnect has been user driven. The Airline Industries Association in the USA have set the pace, forcing the interconnection of 9 vendors. This is an example for other users to follow. It is clear that with a marketplace in 23 countries on five continents, these service offerings cannot be a BT or UK special. They must and do reflect the global positions on X.400.

5 The BT networking portfolio contains public and private data network offerings (and most shades of grey between). The private networks are both Local and Wide Area and not limited to the UK. The public networks are X.25 PSPDN, ISDN and point to point networks with a variety of bandwidths.

5.1 X.25 PSPDN - This commenced operation 8 years ago and is now a maturing network with links to 100 other networks in 80 countries worldwide. The network offers the standard X.25, xxx and X.75. It also offers a range of dial and direct connect proprietary protocol support: SNA, BSC, Error Correcting Asynch, user friendly asynch, Videotex, Credit Card authorisation, and electronic funds transfer capabilities.

In addition to protocol support there are security services primarily for dial access customers.

There is a range of tariff (usage related and unrelated) and management options (Hybrid and Virtual private networks).

The public service offering is complemented by private packet network offerings, LAN WAN Gateways, X.25 communications cards for PC and MINIS etc.

5.2 LANS - BT offers an OSI infrastructure LAN based upon IEEE 8802.3. Other portfolio offerings such as Novell

Netware offer OSI gateways to the infrastructure LAN and both have gateways to the WAN offerings. The X.400 content of the Novell OSI Gateway is a BT product.

5.3 ISDN - BT commenced a ISDN trial in Spring 1985 and its offerings in 3 forms are available at more than 200 centres around the country. Sadly the standards continued to evolve after BT committed to its ISDN development and the resulting singleline service (80K Bits 1B + 2D) has had to be upgraded to reflect the final form of the standard (144 KBit 2B + D). This false start has limited the growth of the service over the last few years. Nevertheless BT has been installing digital exchange and optical transmission capabilities at a significant rate. The BT trunk network is fully digitised and there are 5 million lines of digital local capability installed. These digital exchanges whilst not all offering single line ISDN at 144 KBit do offer multiline service (2 MBit), and do have the more sophisticated call handling capabilities (Closed User Groups, Fixed Destination Call, Fast Call Setup etc. which are useful in a data environment). This investment provides a sound base for the rapid installation of ISDN in its final form.

The agreement of the European standards for ISDN later this year will provide a sound basis for investment for both PTT and multinational users alike.

5.4 Flexible Access - In order to provide larger customers with a rapid reconfiguration of their services, sites with more than a certain number of BT circuits are being provided with a Fibre connection to the BT infrastructure. At the periphery of the BT domain there is a Service access switch which allows access to the full range of BT services, PSTN, Kilostream, Public Data Network etc. Thus changes to services provided can be achieved with no impact on the access infrastructure. This is complemented by a fibre overlay network (for customer access) in the City of London and by BT's involvement in the switched Star Cable TV networks in Westminster and elsewhere. The implications of this are the rapid provision and reconfiguration of bandwidth and ultimately a measure of customer control of this process. (see also para 11).

6 Trends which are observable are the introduction of customer access to BT's Network Management centres as mentioned in 5.4 above. This facility has been in service for Public Data Network customers for the last two years. This represents a blurring of the distinctions between public and private networking with a range of Tariff, ownership, geographical and management options

The availability of Broader band widths and rapid reconfiguration in both the access networks and the core networks.

The potential blurring of national boundaries with pan European MDNS etc.

MANAGEMENT

7 BT's cost base is 66% staff and 33% equipment. By upgrading equipment we address only 33% of the cost base. To make staff more effective we must address the management processes in the company. There is a major multifaceted initiative within BT to address these issues.

8 Strategic Analysis. A thorough strategic analysis of the management processes within the company resulted in the need for increased data transfer between disparate management centres.

9 Management Standards. To cater for the increased data flows within the multivendor management environment open standards for management interfaces are crucial. Accordingly BT was instrumental in founding the OSI Management Forum. This collaboration (originally of 8 vendors and and PPTs) has now grown to a membership of 80. BT holds the technical vice presidency and views these activities as vital to achieving open management standards. BT looks forward to the multivendor demonstration planned in 1991.

10 Implementation. An early implementation of the output of these activities will be in the Flexible Access system mentioned above. In addition it is hoped to create an initial product grouping with a coherent management architecture in the next year or so.

11 Customer Access. These management interfaces will be progressively opened up to customers (albeit slowly and in a limited way). The Insight product available on the Public Data Network is a first instance. We expect it to be followed by others.

INTEGRATOR

12 As a system integrator BT takes the products and services mentioned above, together with others from third parties and builds systems solutions for customers. The coherent portfolio which enables this is vital. Also vital are the applications such as Electronic Data Interchange which make the communications infrastructure useful to human users.

ARCHITECTURE

13 The framework which holds all of this together is BT's Information Systems Architecture. Called Open Network Architecture (ONA), the architecture reconciles BT's ambitions as user and vendor in the IT marketplace. BT seeks alignment between ONA and UK Government OSI profiles (GOSIP) so ensuring that a substantial proportion of the UK IT market is aligned in its purchasing ambitions. The European Public Sector OSI procurement handbook (EPHOS) should also be aligned. The recent publication of Australian Gosip (a carbon copy of the UK) and Swedish Gosip (SOSIP) together with the North American (US and Canadian) versions are being compared and harmonised in an international Public Sector IT collaboration (IPSIT). UK GOSIP is being used as the basis for comparison. Thus a substantial portion of the European IT market will be procuring to the same standards. The Public Sector International ambition is vital to BT as a user and as a vendor. It ensures that other vendors will be producing the products we wish to use. It also provides a marketplace for BT's Products and Services. BT is also encouraging UK Government to extend the scope of its standardisation efforts to include those facets of the systems architecture which lie outside the communications architecture developed in GOSIP. This is at a much earlier stage nationally and, as yet, has not been formally exposed to the international audiences via EPHOS and IPSIT. This internationalisation of the Framework for Open Systems (FOS) has to be a shared contribution for the early 1990s.

14 The scope of ONA includes: -

- an OSI Communications Architecture

- an Application Programming Interface providing a consistent interface between software applications and the OSI communications architecture.

- information architecture and applications support environment enabling users to maximise the value of their investment in software and data

- user interface providing a consistent style of interface for human users. End-users can be protected from the effects of technical upgrades and enhancements.

- cabling and wiring to underpin the communications architecture

- security and naming and addressing issues that are common to all these environments

- ONA-Management Architecture for a coherent strategy for

systems management

- support services such as conformance testing and accreditation

15 ONA Release 1.0. ONA Release 1.0 serves the aforementioned portfolios, Messaging, Networking and Management. Release 1.1 will add to Release 1.0 and in addition it is planned to address Security, Databases and Transaction Processing.

CONCLUSION

16 Deregulation in the UK and competition in the VADS marketplace has forced a staid PTT to react. We look forward to the opportunities this presents us with in Europe (in the build up to 1992) and in North America.

CSD/ONA PM
01-240 9881

CHRIS HOLMES
23 AUGUST 1989

AN ADDENDUM FOLLOWS

INNOVATIONS IN TELECOMMUNICATIONS NETWORKS II

Background

1 The paper presented to the meeting in October was different from that submitted in August. There were some trends observable in the business which seemed more important than the content of the paper submitted. This therefore supplements the paper submitted and should be read in conjunction with it.

Introduction

2 This addendum outlines some trends observable in the industry. It gives an indication of the PTTs' reaction and suggests how users might benefit. The BT Mission captures this reaction. The relevant features of the BT mission for this paper are :-

- The intention to run the telephone company in a cost effective and quality fashion
- The intention to move into value added services and systems
- The intention to internationalise

Trends

3 There are observable trends in three main areas which shape the PTTs' actions. These three areas are:-

- Technical
- Commercial
- Regulatory

Technical Trends

4 Digitalisation. On the switching side rapid digitalisation is a feature of all mature networks. BT is installing between 2 and 3 digital exchanges every day. In 6 years BT has completely digitalised the trunk network and has installed 10 million digital local customer connections. Over half the calls on the network are generated on digital local exchanges. This infrastructure will allow the rapid installation of ISDN services once the Pan European standards for the service are stable early in 1990. BT has had an ISDN service since mid 1985. This is based on an early form of the standards. It is hoped that the adoption of a coherent European position and open procurement for terminal equipment will cause a rapid growth of the services. It is also worth mentioning that the digital

exchanges have a range of facilities of use to the data communications community

- Fixed Destination Calls
- Calling line identification
- Closed user groups.

5 Intelligent Networking Database. Development timescales and installation timescales in telephone exchanges are protracted. As more facilities are provided on the telephone exchanges so cost and complexity rise. PTTs are working on the concept of Intelligent Networking Databases to move Functionality from the telephone exchange environment to a dedicated computer within the telephone infrastructure. This is in an attempt to reduce development and deployment timescales (and costs) and increase market responsiveness. The INDB is to be tied into the telephony infrastructure with a variant of CCITT7 inter exchange signalling. The INDB is tied into the administrative infrastructure with the emerging open systems management standards.

6 On the transmission side progress in digitisation has been rapid. BT has half a million km of fibre in its network. Fibre is now finding its way into the Access Network. Customer sites with several copper pairs will be progressively provided with Fibre Access to the BT infrastructure. This will allow rapid reconfiguration and provision of services and is described in the original paper. This initiative is complemented by the Fibre Overlay network already in service in central London. In addition BT is involved in a number of Cable TV initiatives. Specific interests in this field are the switched Fibre networks particularly those in urban centres such as the West end of London. Thus complementing the City Fibre Overlay to the East.

7 The network and access Fibre programmes are complemented with building wiring schemes which integrate twisted pair, coax and blown fibre. Blown fibre is the use of unshielded fibre which can be blown (with compressed air) along 1km of cheap small bore plastic tube. The plastic tube can be installed in the building and jointed with simple push fit connectors. The fibre in bundles of 2, 4, 8 can be blown from basement onto the desk. Cable upgrade is simply a case of blowing out the old fibre and blowing in the new.

8 Mobile. The evolution of mobile communications has been (and continues to be) rapid: Cellular, Telepoint with cheap light handsets now in service in UK, the move to Pan European working. The latter brings some interesting administration problems. Consider a telephone billed in Paris making a call from London to Barcelona. These services are now finding data applications in the Police

Force and the freight industry. The linkage between INDB and Mobile is also a source of much activity.

9 Value Added Networks. BT is involved in managed data networks, value added platform services such as messaging and information services built on top of these platforms. BT also encourages others to build their own platforms and information systems on the public service networks and platforms.

Commercial Trends

10 In the last decade there has been major change. This is captured in the change of terminology from subscribers to customers. The 30 years of chronic under investment have come to an end. The waiting list of 1-2 million is no more and service is usually provided within days in a new competitive environment.

11 Tariffs. Tariffs are increasingly tied to quality of service improvements. Service levels which offer 5 hour repair 365 days a year 24 hours a day, 5 hour repair 5 days a week, 8 hours a day etc. are all available. Tariff options which allow reductions for bulk users, usage unrelated tariffs, distance independent tariff etc., are all becoming available.

12 Internationalisation. Customers are multinationals and want a multinational service. The competitors in the VADS business (IBM, Giesco, AT&T) offer such a service and the PPTs will respond.

13 Equipment Life. Strowger exchanges were depreciated over 20 years (and frequently carried on functioning for another 30). The depreciation of modern telephone exchanges is over a much shorter period. This with advances such as Intelligent Networking databases allow a much swifter response to changing user needs.

Regulatory Trends

14 The general tendency is to deregulate but in such a way as to defend the existing infrastructure but to open up provision of new services such as VADS, MDNS, Mobile. Open terminal procurement is also much sought after by regulators.

PTT Reaction

15 These trends suggest the reaction which are common (to a greater or lesser extent) to most PTTs. The BT mission captures our response viz.,

- Manage the Telephone Company Effectively

- Internationalise

It is this latter which is the focus for the rest of this paper.

Why Internationalise

16 Some of the reasons have been suggested, customer pressure and the fact that the VADS competitors offer such services. It is clear that competition in the domestic markets will limit growth and that the opportunities now lie overseas. The UK regulator will also manipulate the domestic market for instance effectively precluding us from participating in the next stages of the mobile marketplace in the UK. Thus if we wish to continue to develop our expertise in mobile we will have to do so overseas. There are also reasons of scale. A domestic customer premises equipment business is probably too small to be viable in the long term.

How to Internationalise

17 There are three main options, all of which are used. Organic growth builds an infrastructure of offices and operations worldwide. BT now has a presence in all major capitals (and a lot of minor ones) worldwide. BT and its subsidiary has for instance, more than 6500 staff in USA.

18 Acquisition is a valuable technique for gaining an operational presence internationally and for securing a basis for a Global customer premises equipment business. BT has been active in this field with Mitel, Dialcom, Mcgraw (and perhaps Tymnet).

19 Collaboration takes 3 forms and has two main drivers. The drivers are the marketplace and the regulator. The effect of UK regulation on Mobile and EEC regulation on ISDN have been described.

- Inter PTT collaboration. BT now has one stop shopping arrangements for base services with USA and Japan (with several others in hand). These one stop shopping arrangements are also extending to MDNS. There is agreement by the CEPT membership to move further in the direction of one stop shopping.

- Joint Ventures. Joint ventures may be appropriate where acquisition or local operation are inappropriate. This might apply in protected markets where a local partner is politically necessary. It is worth repeating that growing collaboration between PTTs offering one stop shopping offer alternatives to international operations

- R&D Exploitation A PTT is not an ideal organisation to exploit certain R&D activities. Multinational joint

ventures with manufacturing specialists allow such innovations to reach the market effectively.

20 To summarise international activities feature co-operation and competition in the field of Value Added and Managed Data Networks and mobile communications. The rapid advance of co-operation and collaboration over the last 12 months reduces some of the pressures for international competition.

User Implications

21 The growth of international co-operation between PTTs, the overseas operations of PTTs and the growth in the range of services must all enrich the users options. The communications needs of a mature user can be met by the spectrum of ownership and tariff options between public and private networks. networks .

MEGATENDANCES

par

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RESUME

Cinq Mégatendances dans le domaine du transfert électronique d'information sont identifiées:trois sont d'ordre technologique,une relève des aspects socio-économiques,la dernière est dépendante des résultats de la recherche . Cette analyse permet de tracer les contours du paysage futur qui attend les utilisateurs de systèmes d'information.

Lorsque l'on analyse le domaine du transfert électronique d'information et son évolution , il apparaît très vite que ce secteur est en mutation forte et rapide et qu'il est traversé par de nombreuses transformations . Il n'est pas bien difficile d'identifier et d'énumerer tous ces mouvements élémentaires :

-apparition de la télématique
-avènement de la micro-informatique
-naissance des supports optiques
-développement des réseaux à intégration de services
-achats multiples de R. Maxwell
-apparition de nouveaux acteurs industriels

-appels d'offres de la Commission des Communautés Européennes

-possibilité de transmettre des images

-nécessité de nouvelles compétences ....

Par contre il est bien plus délicat d'agréger ces différents éléments pour faire apparaître les grandes tendances qui moduleront notre futur.

Nombreux sont ceux qui ,spécialistes d'un domaine , se sont aventurés à tenter de prédire l'avenir et qui se sont trompés : ainsi le maréchal Foch en 1911 déclarait: " les aéroplanes sont des jouets intéressants , mais sans avenir militaire" , l'amiral Clark Woodward affirmait en 1939 : "pour ce qui est de couler un navire avec une bombe , ceci est impossible " .Ces quelques citations montrent bien la difficulté de l'exercice qui m'est demandé aujourd'hui , je me bornerai donc a essayer d'identifier quelques mégatendances sous-jacentes au domaine du transfert de l'information et a en examiner les conséquences prévisibles.

Je me suis fixé à priori trois plans d'analyse du paysage :

-le plan technique ou plutôt technologique afin de détecter les nouvelles possibilités, les ouvertures que l'on peut attendre du bouillonnement qui caractérise notre secteur aujourd'hui

-le plan économique afin de mettre en évidence les grandes opérations :rapprochements ,rachats ,fusions ,ventes etc .... qui modifiant les rapports de force au plan mondial risquent d'avoir des conséquences au niveau de l'utilisateur

-le plan recherche afin d'éclairer le paysage le plus loin possible en isolant les orientations qui semblent aujourd'hui les plus prometteuses et les plus porteuses de changement

Pour chacune de ces approches ,je me suis attaché à envisager les conséquences des évolutions en me situant délibérément du coté de l'utilisateur, qu'il soit utilisateur final ou intermédiaire , en essayant d'identifier les éléments les plus novateurs pour l'utilisation des systèmes d'information .

Après avoir longuement hésité , je me suis décidé à sélectionner ,parmi les nombreuses hypothèses que j'avais pu échafauder, 5 mégatendances qui , me semble-t-il , devraient avoir un impact majeur sur le sujet considéré . Sur ces 5 mégatendances , 3 relèvent des aspects technologiques , 1 relève des aspects socio-économiques et la dernière s'incrit dans une perspective de recherche .

MEGATENDANCE 1 :

"Mélange de l'information interne à une organisation avec l'information externe disponible via les grands services commerciaux d'information."

Il est bien évident que pour répondre à cette nécessité les professionnels de l'information n'ont pas attendu que la technologie leur offre une solution miracle , ils ont developpé des solutions manuelles , des solutions ponctuelles qui leur ont permis de répondre à la demande de leur clientèle .

Les nouvelles technologies apportent dès maintenant et vont apporter dans l'avenir proche des solutions beaucoup plus ergonomiques et surtout beaucoup plus puissantes , on peut d'ores et déjà décrire 3 concrétisations de cette mégatendance :

-le mariage du micro-ordinateur avec la télématique, permettant de télédécharger des informations sur un poste de travail pour les intégrer dans des documents locaux et internes, a ouvert des perspectives nouvelles . L'apparition de systèmes peu coûteux de Publication Assistée sur Ordinateur (PAO) fonctionnant sur micro-ordinateur permet d'intégrer complètement l'outil d'information dans le travail quotidien . On voit par là une manière , pour les systèmes d'information , de se rapprocher du fameux "utilisateur final ".

-Le développement récent des logiciels dits "hypertexte " est en passe d'offrir maintenant à l'utilisateur, sur micro-ordinateur, des systèmes d'information particulièrement simples à utiliser ,extrêmement puissants et d'une grande ergonomie . Si l'on ajoute à cette avancée logicielle , les avantages technologiques des CDROM on aboutit à des postes de travail alliant la facilité d'utilisation de l'hypertexte à la grande capacité de stockage des disques compacts et de surcroît capables de fonctionner en station autonome.

-Si maintenant on intègre sur un même poste de travail une connection à un réseau RNIS (réseau numérique à intégration de services ,ISDN en anglais) et un disque optique numérique on obtient une station à même de recevoir en temps réel des flots d'information considérables ,de les stocker et de les traiter. Apparaît donc le poste de travail qui cumule les avantages des scénarios précédents , sans aucun des inconvénients .

MEGATENDANCE 2 :

" une information de plus en plus riche "

Jusqu'à présent les utilisateurs des systèmes d'information devaient se contenter d'une information sous forme uniquement textuelle ,souvent même appauvrie par rapport aux livres ou périodiques habituellement disponibles : lettres non accentuées, police de caractères unique ,mise en pages médiocre etc....

Les systèmes de traitement de textes ,les systèmes de PAO apportent une amélioration certaine en produisant des textes nettement

plus agréables à lire mais qui restent "unidimensionnels "

L'arrivée des supports optiques tels que les vidéodisques ,les CDROM ,les disques optiques numériques autorise maintenant l'accès à une information multi-media qui mêlant le texte,les graphiques,les images fixes ,les images animées et même le son.

Ces systèmes d'information qui se profilent dans un avenir proche apporteront une plus-value considérable à la communication d'informations professionnelles en recréant quasiment les conditions naturelles de la communication humaine .

Les premières applications que l'on peut identifier aujourd'hui qui utilisent largement ces possibilités multimedia sont les systèmes d'enseignement assisté par ordinateur en particulier dans les secteurs

technologiques et dans l'apprentissage des langues .Il est plus que probable que l'intégration de ces nouvelles technologies pour créer des produits d'information riches multidimensionnels trouvera rapidement de nouveaux champs d'application .

MEGATENDANCE 3:

"intégration verticale des fonctions documentaires"

Dans la chaîne documentaire actuelle qui va de l'interrogation bibliographique jusqu'à la fourniture du document recherché ,en passant par la localisation du document et sa commande ,l'utilisateur doit passer d'un système à un autre ,en traduisant les informations qu'il extrait d'un coté pour qu'elles puissent être assimilées de l'autre .

Cette accumulation de dispositifs non coordonnés souvent incompatibles entre eux représente pour l'utilisateur une difficulté majeure et donc un frein à leur utilisation.

C'est pour répondre à cette éxigence de simplification que se mettent en place des systèmes intégrés permettant de parcourir l'ensemble de la chaîne documentaire de façon coordonnée .On voit maintenant apparaître la possibilité de recevoir directement les documents par la voie électronique , ceci en particulier grâce aux réseaux RNIS qui sont capables d'acheminer des quantités d'information considérables pour des coûts "raisonnables".

Il est donc tout à fait licite d'imaginer qu'à court terme seront disponibles des systèmes complètement intégrés sur lesquels il sera possible d'exécuter une recherche bibliographique et ,dans la foulée ,de commander les documents les plus pertinents qui seront fournis instantanément sur l'imprimante laser du micro-ordinateur local.

MEGATENDANCE 4 :

"Intégration verticale et horizontale des acteurs économiques"

Jusqu'à ces dernières années ,au sein du secteur qui nous intéresse les choses étaient simples en ce qui concerne les acteurs ,il y avait :

- -les éditeurs de publications
- -les producteurs de banques de données
- -les serveurs de banques de données
- -les intermédiaires ou brockers
- -les utilisateurs

Ce schéma est aujourd'hui totalement bousculé et le sera très certainement encore plus dans le futur ; en effet les quelques exemples suivant montrent clairement l'animation du secteur :

-création par Chemical Abstract Services d'un serveur
-rachat par Maxwell du serveur Infoline
-rachat par Maxwell des sociétés Molecular Design et Orac
-achat par l'éditeur américain Knight ridder du serveur Dialog
-création par l'éditeur allemand Bertelsmann d'un serveur
-achat par Maxwell du serveur Orbit
-achat par Maxwell du serveur BRS
-achat par Maxwell du producteur serveur Official Airlines Guides
-achat du producteur Dafsa par l'éditeur Expansion
-etc.....

De toutes ces initiatives il ressort clairement deux grands mouvements : -intégration verticale :d'un coté les éditeurs qui, en amont de la chaîne , cherchent à prendre le contrôle de la distribution en rachetant les producteurs et les serveurs ;d'un autre coté les imprimeurs ,les photocomposeurs qui remontent la chaîne pour s'intéresser de près à l'édition électronique

-intégration horizontale :les serveurs tendent à se regrouper afin de générer des économies d'échelle et d'éliminer la concurrence.Le nombre des serveurs ayant un rayonnement international est en constante diminution

Ces constatations sont à rapprocher de ce qui se passe dans le secteur de la communication : on observe une tendance très forte à la concentration et les spécialistes estiment que d'ici l'an 2000 cinq groupes se partageront le marché mondial. Or ,les acteurs économiques qui opèrent dans le secteur de la communication sont les mêmes que ceux qui investissent aujourd'hui le secteur de l'information professionnelle !

Il faut donc s'attendre à une modification radicale du paysage de l'industrie de l'information.

MEGATENDANCE 5 :

" vers des systèmes intelligents "

Si l'on examine les recherches en cours et si l'on essaye d'identifier celles qui devraient avoir un impact sur le transfert électronique d'information ,il me semble qu'un thème se dégage de façon incontestable : "les recherches sur les réseaux neuronaux".

Si aujourd'hui on parle beaucoup de systèmes experts , d'intelligence artificielle sur le terrain la réalité est nettement moins féerique : le serveur continue à vous insulter à la moindre virgule mal placée , au moindre espace en trop ,à la moindre faute d'orthographe .

L'apparition des premières "machines connexionnistes " ou "ordinateurs à réseaux neuronaux" qui cherchent à imiter le fonctionnement du cerveau en reproduisant artificiellement l'architecture neuronale semble être le saut technologique tant attendu qui devrait permettre de traiter correctement ces problèmes "tarte à la crème " que l'informatique traditionnelle s'échine depuis 30 ans à résoudre :

-traitement du multilinguisme
-compréhension du langage naturel
-reconnaissance de caractères imprimés et manuscrits
-synthèse de la parole
- etc .....

Pour ne citer que ceux là .Les applications sont innombrables : EAO ,recherche documentaire ,aide à la décision ,traduction automatique ,surveillance et sécurité ,diagnostic technique et contrôle de qualité etc....

Une particularité notable de ces recherches sur les réseaux neuronaux est qu'elles concernent de nombreuses disciplines scientifiques qui ,jusqu'à présent ,avaient peu d'occasions de se rencontrer .neuro-sciences (neuro-biologie ,neuro-physiologie ,biologie moléculaire) ,sciences cognitives (psychologie ,psychiatrie),physique ,informatique mathématiques ,électronique, etc.....

Une véritable révolution se prépare pour les années 1995 ; car , si l'espoir que l'on peut placer dans ces recherches connexionnistes n'est pas déçu ,on assistera à un changement de même ampleur que lorsque l'on est passé du papier à l'électronique, puis de l'électronique à l'opto-électronique : il s'agira de passer de l'opto-électronique à la connexionnique et donc à l'ère des systèmes intelligents.

CONCLUSION :

Le bref survol des futurs possibles du domaine de l'information professionnelle que nous venons d'effectuer montre clairement la vigueur et le dynamisme de ce secteur ; on peut ,en conclusion , tirer les deux remarques suivantes :

-d'une part une tendance favorable pour l'utilisateur qu'est l'évolution vers des systèmes mieux adaptés ,plus conviviaux , plus ergonomiques en un mot plus intelligents

-d'autre part la naissance d'une veritable industrie de l'information avec ses avantages (concurrence , marketing ,agressivité etc...) jouant en faveur du client ,mais aussi ses enjeux économiques et donc ses dangers (concentration ,ventes et rachats sauvages)qui peuvent ,dans certains cas , ignorer l'intérêt des clients (par exemple en supprimant certains produits pas assez rentables ou en pratiquant des prix prohibitifs !).

Après avoir été longtemps couvé par les pouvoirs publics ,ce secteur d'activité est en voie de transformation : une véritable industrie est en train de naître ; Les utilisateurs ou plutôt les clients de ce domaine doivent donc être vigilants afin que cette mutation se fasse en douceur et qu'ils soient,au bout du compte, les bénéficiaires du changement

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OPTICAL DISC SYSTEMS

by

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SUMMARY

The presentation consisted of a short introduction about today's and tomorrow's technology in optical discs — CD audio, CD video, CD interactive, CD-ROM, WORM, followed by a discussion of the applications of these media in the professional market for CD-ROM and WORM from a conceptual point of view, the implementation of the technology into a system (Megadoc), and a brief overview of the system itself.

Unfortunately, the author has not provided a copy of the text of the presentation, so copies of his vuegraphs follow.

OPTICAL DISCS

1) TECHNOLOGY

2) OVERALL PICTURE PROFESSIONAL

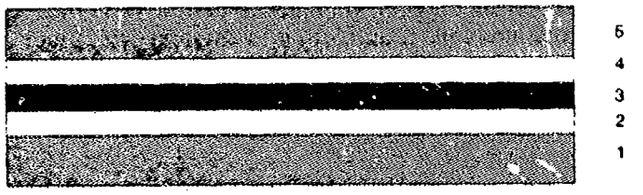
3) CARACTERISTICS, BENEFITS

4) PROFESSIONAL ENVIRONMENT

5) APPLICATIONS

1) TECHNOLOGY

1.1 WHAT ?



1-5 layer (glass, plastic)

2-4 air

3 information carrier

1.2 TYPES

- ROM, WORM, REVERSIBLE
- DEPENDING ON TECHNOLOGY, SUBSTRATE OF CARRIER WILL BE DIFFERENT
- SIZE OF THE DISC IN REGARD TO CAPACITY
- DEPENDS OF THE APPLICATION
- ALL KINDS OF OPTICAL DISCS ARE COMPLEMENTARY

1.3 CLASSIFICATION ON TECHNOLOGY

- R.O.M. (read only memory)
  - C.D. compact disc format = 12 cm
  - L.V. laser vision format = 33 cm

- W.O.R.M. (write once read many)
  - 5 1/4" = 800 Mbyte
  - 12" = 2 Gigabyte

- REVERSIBLE
  - in development
  - not stable yet (drive)

1.3.1 R.O.M.

- C.D. - AUDIO
  - 12 cm diameter
  - 74 min HIFI/Stereo
  - CD-audio player -> HIFI
- C.D. - VIDEO
  - 12 cm diameter
  - 5 min video (clip)
  - 20 min audio
  - CD-video player - HIFI - TV also CD-audio compatible
- L.V. - (ROM)
  - 33 cm diameter
  - 154.000 still frames
  - 1 1/2 h video + audio
  - L.V.-player - HIFI - TV - (C.P.U) combiplayer : CD as well as L.V.

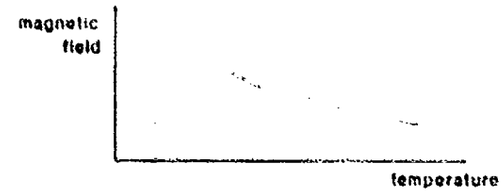
- CD-ROM
  - 12 cm diameter
  - 654 Mbyte
  - MS-DOS - PS2 - via interface to C.P.U
  - text - (and bit map pictures)
- CD-ROM - X.A.
  - 12 cm diameter
  - 654 Mbyte
  - MS-DOS - PS2
  - mixed mode CD
  - text, audio, stills, moving pictures
- CD-I
  - 12 cm diameter
  - real time operating system
  - black box
  - text, audio, stills, video

1.3.2 WORM

- 5 1/4" WORM
  - capacity of 800 Mbyte
  - dubble side
  - MS-DOS, PS2, SCSI
  - removable
  - no standardisation
- 12" WORM
  - capacity of 2 Gigabyte
  - dubble side
  - MS-DOS, PS2, SCSI
  - removable
  - no standardisation

1.3.3 REVERSIBLE OPTICAL DISC

- TWO TECHNICS ARE AVAILABLE :
  - Opto-magnetic
  - Amorphe-cristaline
- Opto-Magnetic
  - quick access to information
  - erasing and writing in one step
  - substrate with following characteristics



  - no influence of external magnetic fields at room temperature
  - no high stability of the information in time

- Amorphous-cristaline
  - status of the substrate changes under influence of laser energy
  - no writing function during erasing
  - no influence due to external conditions
  - stability of information is high

2) OVERALL PICTURE PROFESSIONAL

2.1 SPECIFICATIONS

- If we compare applications in professional and consumer market no difference
- If we compare medium in professional and in consumer no difference
- Can we accept in professional the same error detection, error correction code as in consumer (10^{-2})
- How many discs should be checked within production process
- What about hardware to read (write) information from (on) the disc
- Should we follow standards

2.2 TYPES

- USE OF CD FOR DATA STORAGE IN COMBINATION WITH PC

1) CD-ROM
   - read only
   - no destruction of information possible
   - everyone uses same information
   - program, index and information on same disc
   - enormous amount of information on the CD-ROM
   - after error detection, error correction we obtain 10^{-16}
   - only readable on a special drive (CD-ROM drive) in combination with a special interface (MS-DOS, PS2, SCSI) connectable to C.P.U.
   - drive has a M.T.B.F. of 16.000 h.
   - standard ISO 9660

2) CD-ROM X.A.
   - compact disc read only memory extended architecture
   - data storage in combination with audio and or graphics and or stills and or video
   - graphics - EGA, VGA, VGA+ ...
     - audio - telephone quality, A.M., F.M., HIFI stereo
     - video - moving pictures
   - full screen, full motion needs real-time operating system

3) BENEFITS

- READING (AND WRITING) WITH A LASER BEAM
- NO MECHANICAL CONTACT
- NO LOSS OF QUALITY
- HIGH DENSITY (650 MBYTE ON 12 CM DISC)
- INFORMATION CARRIER IS MECH. PROTECTED
- ROM-DISC EASY TO REPRODUCE AT LOW COST
- AT LEAST 30 YEARS READABILITY WITH INITIAL QUALITY
- EASY TO DISTRIBUTE
- WEIGHT

4) OPTICAL DISC IN PROFESSIONAL ENVIRONMENT

R.O.M.

- DISTRIBUTION MEDIUM FOR MASS INFORMATION
- ACCESS TO INFORMATION
- ACCESS-TIME TO THE DISC
- COMPLETE CONTROL OVER INFORMATION
- NO OVERWRITING POSSIBLE
- MINIMUM NUMBER OF REPLICAS
- MULTI-INFORMATION MEDIUM
- INTERACTIVE
- IN USE AS PERIPHERAL OF P.C.

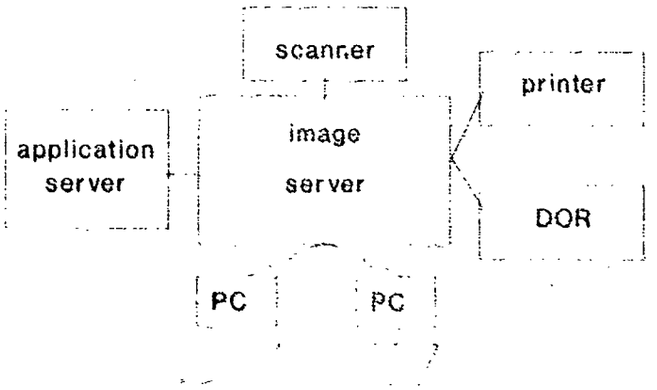
W.O.R.M.

- WRITING UNDER DIGITAL FORM
- INPUT VIA FAX, PC, WP, SCANNERS
- STORAGE FROM 2 GIGA -› 400 GIGA/SYSTEM
- IN USE FOR ARCHIVING
  - 5 1/4" FOR PERSONAL ARCHIVING
  - 12" FOR DEPARTEMENTAL ARCHIVING

5) APPLICATIONS

ROM : - OVER 500 TITLES SOLD
- INTERNAL COMPANY USE
- MANUALS, INSTRUCTIONS, DATABASES, ENCYCLOPEDIA

WORM : - MEGADOC



Document Delivery via ISDN or Satelite Networks

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Summary

As a preliminary to discussing telecomms networks and services, this paper presents from a theoretical viewpoint the main characteristics of documents and document delivery systems ; the physical and functional characteristics of archives and document receiving terminals are also presented.

An outline review of voice and data communications networks in W. Europe is presented. The plans for the introduction of ISDN services, and the facilities offered by experimental and operational satellite services are discussed.

Standards aspects of telecomms services are considered, in particular the layer 7 protocol elements. The emergence of open distributed processing in ECMA and ISO and the associated client/server model are mentioned in this context.

1. Introduction

This paper explores various options for electronic document delivery. What we interpret as a document is first described and then in section 2 a general model of the components of a document delivery system is presented.

Networks and the services they support relevant to document delivery are discussed in section 3 with emphasis on integrated services digital networks and satellites.

The rôle of standards for data interchange in open systems is discussed in section 4, where the accent is put on the development of the principles of the client-server model, and the latest progress with the clarification of the application layer of the open system interconnection reference model.

2. Documents and document delivery systems

2.1 Documents

Let us begin by defining terms. For the purposes of this paper a document will be defined to be a structured data set of which there is a lasting (i.e. permanent or semi-permanent) independent record for the purpose of transferring information or knowledge between human beings

In practice we may put a restriction on this somewhat vague definition by adding that documents are limited in size to match the average human being's span of concentration and are in some sense self-contained.

Another point is that in IT environments documents are stored with essential ancillary data that is not intelligible immediately by the people using the documents but is needed for the IT system to work.

Typical examples of documents are :

- books,
- journal articles,
- letters, memos, forms,
- stored voice messages,
- photographs, films.

The fact that different document data sets have different structures has important consequences for the design of IT systems to handle them efficiently from economic and human convenience points of view.

Analysis of various common document data structures is significant for the definition of appropriate standards for document storage, transmission and management. We shall come again later to the important issue of standards.

For the moment we note the following data structures : text ; tabular data/text ; pictures (vector graphics, raster images) ; moving pictures ; and sound recordings. Composed or mixed mode documents contain mixtures of these structured data types ; also, picture resolution, colour, half-tone images have to be catered for ; such added complexity represents a challenge for IT systems designers, especially when price/performance is considered, as well as for standards definers.

Moreover, document data set structures come in two broad kinds : physical, mainly concerned with visualization on screen or page ; and logical, mainly concerned with how the information is to be processed in IT systems.

Before leaving document data structures mention must be made of data compression/decompression and encryption. The former is applied to save storage and, particularly, transmission costs (at the expense of processing power, which, however, is usually available at marginal cost). The latter scrambles the original data set to render it unintelligible to unauthorized nosey-parkers and usually increases its size. Both these techniques cause the data structures for recognition by humans and machines to require transformations.

The physical supports in common use for document storage are :

- paper (various formats (A3, A4...) quality..., etc),
- magnetic and optical media (tape, diskette, Winchester, CD-ROM, WORM, etc...),
- static semiconductor (ROM),
- engravings (plastic records, stone tablets, etc...).

Choice of physical support is a decision dependent upon use to be made of documents and cost. This is why the paperless office is not yet in view despite meteoric IT progress in the last 40 years.

2.2 Document delivery systems

At its most basic, a document delivery system comprises just three components : a document store or archive (a sending station) ; a means of delivery, i.e. transmission/telecomms systems ; a receiving station.

This description is deceptively simple for there are myriad ways of realizing each of the three components some of which can be mixed and matched. I intend to say virtually nothing about the postal services, instead concentrating on digital document delivery between computers via networks.

It is worth noting, however, that postal services are still the only means of delivering certain types of documents where the physical characteristics of the supporting medium are considered to be essential, and also that postal services can be combined successfuly with electronic delivery means for optimal quality of service.

Although the sending and receiving stations can sometimes be the same (e.g. basic group 3 facsimile). The general rule is that they are not and data communication is asymmetrical.

The means of delivery will be discussed in section 3 below ; the terminal and machines will now be described in outline.

2.2.1 Document store or archive

First we shall consider the main physical modules and functions of the document store or archive. Typically an archive can be : a basic, minimal storage telecopier (group 3) , a PC with a data communications interface to either a wide area network or a local area network ; or a mainframe with data communications hardware and software.

The latest generation of 32-bit microprocessors (Intel 80486, Motorola 68040, etc...) clocked at 25-33MHz and the continual development of 5 1/4 Winchester disk technology to greater storage densities, not to mention the advent of optical storage with improving characteristics, are bringing about a startling transformation in the price/performance ratio of computers. Formula 1 PCs or technical workstations are putting mainframe power on the desktop ; their price is coming down to the point where there will no longer be a need, i.e. a market, for basic telecopiers that do nothing other than operate in real-time handshake mode over the telephone network.

For this reason, let us ignore the basic telecopier and the mainframe, and examine in more detail a possible configuration of a typical PC multiprocessor document archive. The physical modules are : the controller/CPU ; operator interface (keyboard, pointer, screen) ; scanner/analyser ; printer ; coder/decoder (for compression/decompression) various optional memory devices ; optional Ethernet controller ; and a choice of communications interfaces.

Archive controller

At the heart of the document archive is the controller or central processing unit : a personal computer motherboard with its microprocessor, ROM, dynamic RAM, and memory management unit. Since handling mixed-mode documents requires intense bit manipulation and, as we shall see, carrying out many functions, it is preferable, to have a machine with a least 1MB RAM, a 20MHz Intel 80386 or Motorola 68030, and a cache. A 25-33Mhz 80386 or 68030 RAM would be better.

As regards the operating system, we are still in the era of Ms-DOS, with due respect to Apple Mac and OS/2 has not yet taken off in the way IBM intended it to, and with all that computing power now available, UNIX, in the ascendant, is a real challenge to it. Indeed, UNIX could well become the de facto standard.

The interesting feature of UNIX is that it is a multi-tasking, multi-user operating system, whereas MS-DOS is designed only for handling a single task at a time for a single user although it can do better. This can be important for document archives which are likely to be required to support many local administrative jobs concurrently with sending documents and receiving online requests for documents to be delivered. A graphical user interface like Motif should be part of the design.

Local Input/output

The system administrator and/or document delivery service operator needs a terminal consisting of a keyboard, a screen and a pointer, e.g. a mouse. It is preferable that a completeA4, or even an A3, page can be visualized on the screen ; with windowing this facilitates the operator interface when dealing with complicated document management procedures.

The pointing device is convenient for using dialogue menus of the graphical user interface.

In order to digitize documents from paper, a scanner is needed ; it may be advisable to be able to scan A3 and A4 formats as well as B4, and to be able to transform A3 to A4 and B4 to A4. Resolution should be selectable from 200, 300, 400 or 600 pixels per inch and scan speed from six to eight pages per minute. Automatic sheet feeding is also a useful feature.

The raster scanned image can be compressed using a hardware coder. For documents containing only text, if storage is at a premium, software for performing optical character recognition and identifying page layout may be used to transform the scanned image into an appropriate text processor format.

A printer with 200, 300, 400 or 600 pixels per inch resolution is the other physical device requirement, a decoder doing decompression when necessary.

Document storage

Memory is of course required to store documents. It is not that important whether it is magnetic or optical, but it should be big enough to hold, at least for the time needed, a sufficient number of documents, and have access times and transfer rates that are adequately fast.

Communications

Insertion of digital representations of documents into telecommunications networks for delivery requires one or more communications modules in the document archive.

A link with the public switched telephone network is useful because of its wide geographical coverage; however its data transmission speed leaves much to be desired : 300 bits/s - 2400 bits/s recommended, with group 3 telecopier systems going up to 9600 bits/s, giving transmission times of about 20 - 40 secs for a page at 200 pixels per inch resolution.

In addition to the public telephone network there are national public packet switched data networks and in some countries circuit switched networks that can be used at intermediate data rates, say 9600 - 48000 bits/s.

In the near future in many parts of the world ISDN connexions will be available with basic rate access (64, 144 Kbits/s) and primary rate access (2.048 Mbits/s in Europe, 1.544 Mbits/s in North America).

Functional requirements

The document archive has to provide the following functions.

For operations the requirement is :

- control of requests and deliveries,
- delivery of references and abstracts,
- control of local interfaces,
- creation, editing and deletion of document files,
- optional security, confidentiality when necessary.

For administration purposes :

- billing,
- user file record so that documents are sent in receivable form,
- user and system statistics,
- directory and distribution list management

are the major functions that have to be implemented in the archive.

As recommended above, the document archive and delivery service should offer an adaptable menu dialogue via a graphical user interface.

2.2.2 The Document Receiving Station

Typically, a document receiving station will be a desktop computer with a suitable operator interface (keyboard, screen, pointer), a 300 pixels per inch printer, a memory buffer and of course the telecomms interface necessary to receive documents.

Currently MS-DOS is the most common operating system, though for reasons cited before concerning the multiprogramming needs of the document archive, we can anticipate that by the early 1990s UNIX will be preferred.

The applications software should have an attractive, easy-to-use graphical user interface. Since documents may be received in character-coded, facsimile (group 3 or 4) or mixed mode, the document terminal must be capable of handling all these document file formats.

Also, in many instances the document terminal is likely to be incorporated into a local computing environment which may include a local area network. Since the organization may wish to forward the document electronically, to recipients who use other terminals, the document terminal will be required either to provide file transfer across the local area network (e.g. FTP), or to incorporate a distributed file server (e.g. NFS) or to offer mailbox facilities (e.g. MHS). It is to be noted that only the last-named is an international standard.

3. Networks and Services

Let us explore briefly the means of document delivery via networks and the services offered over them.

Setting aside the telex network, which, although useful for the purpose we are discussing, namely document delivery, is so restricted in speed, character set and lay-out possibilities that it will almost certainly be superseded in the coming years, let us briefly consider the chief characteristics of five network types :

- public switched telephone,
- circuit switched data,
- packet switched data,
- integrated services digital,
- satellite,

and then focus attention on the last two.

3.1 Public switched telephone network

In addition to its main purpose, namely telephony, certain data services have for many years used this network ; access to data bases, facsimile, videotex, teletex, electronic messaging are well-known examples.

Data rates, though they have improved from 300 to 2400, 4800 and even 9600 bits/second in some places are generally inadequate for data communications in the modern era.

Tariffs depend on distance and time, are punitive for international circuits and are not related to costs. Modems add to the bills for data communications. The ubiquity of the public telephone network is nevertheless an advantage.

3.2 Circuit switched data networks

A few national public switched data networks have been implemented (e.g. DATEX - L in the Federal Republic of Germany), and a number of private international organizations, notably in banking (SWIFT) and airline management (SITA), have built their own. During the 1970s and 1980s packet switching has been a more popular technology, except where voluminous data messages or very few switching nodes are required. Data rates can be high (e.g. 2Mbits/second) provided the cost is justified. They are not sufficiently widespread to be used as a vehicle for electronic document delivery except within those organizations which can afford them.

3.3 Packet switched data networks

Most Western European countries have public packet switched data networks, and according to Logica's Telematica study there are some 14 000 private data networks in this region in 1989.

Packet switching is a viable technology for transmitting character-coded documents which contain say 2500 characters per page and on average 10 pages ; the transfer of 25000 bytes (say 50 packets) between two access points of a packet switched data network is not unreasonable. However, to use such a network to transfer a document of the same size in facsimile mode because it is on paper only, not stored in a machine or treatable with CCR, is less attractive.

At 300 pixels per inch resolution, even compressed with Huffman or Modified READ algorithms, there would be of the order of 10 million bits (1.25 million bytes) to transmit, corresponding to some 2500 packets. Packet assembly/disassembly seems a costly extravagance in this case, especially as error detection and correction can generate even more transmission traffic.

Between packet switches the data rates are often 48 Kbits/second ; the tails between the users' premises and packet assembler/disassemblers or X.25 machines and X.25 switches are usually, however, much lower grade with speeds of 300, 1200, 2400, 4800 or 9600 bits/second.

To illustrate transmission times for documents on these networks, figure 1 is a plot file size versus

time with lines at well established rates.

Also, international connections between national packet switched networks are not very reliable ; they can be a weak link in the chain especially when the traffic through them is high.

3.4 Integrated services digital network

As is widely recognized we have witnessed in the last 15 years a technological convergence of the computer and telecomms business into the telematics one.

A catalyst for this process has been the parallel evolution toward digital processing and the use of integrated circuit components in computers and communications switching and transmission equipment. AT&T now make computers and IBM telecomms devices. The much vaunted, though rather sedate, arrival of the integrated services digital network is perhaps the most striking single manifestation of this convergence. So what is an integrated services digital network? When shall we be able to use it? And, what for?

The types of customer access to ISDN services are specified in CCITT Recommendation I .210 : Principles of telecommunication services supported by an ISDN.

ISDN access functions are partioned into five equipment groups :

(i) Network Termination 1 which performs the physical and electromagnetic termination of the network (physical OSI layer 1) ;

(ii) Network Termination 2 (NT2) which includes such functions as OSI layers 2 and 3 protocol handling and multiplexing, switching, concentration, and layer 1 functions (examples of NT2 equipment are : PABX, local area network and terminal controllers) ;

(iii) Terminal Equipment type 1, which has an interface with ISDN user-network interface Recommendations of CCITT (e.g. digital telephones, data terminals or work stations with ISDN interfaces) ;

(iv) Terminals Equipment type 2 (TE2) which has an interface complying with CCITT Recommendations other than the ISDN ones (e.g. X-Series) ;

(v) Terminal Adaptor includes functions that allow a TE2 to be served by an ISDN user-network interface.

There are many interface structures and access capabilities foreseen for ISDN users. Without going into detail, there are three channel types of interest to most people : B channel (64Kbits/sec.) ; D channels (16 or 64Kbits/sec.) ; and H channels (H0 at 384Kbits/sec., H11 at 1536Kbits/sec., H12 at 1920 Kbits/sec.).

A B channel can be used to provide access to, for example, circuit switching, packet switching or semi-permanent connection modes of communication.

An H channel is intended for carrying information streams on a dedicated, alternate or simultaneous basis. Example streams are : fast facsimile ; video for teleconferencing ; high speed data ; high quality audio ; multiplexed mixed information ; packet switched data.

Two main ISDN user/network access capabilities defined in CCITT Recommendations are :

- basic access : 2 B + D (64 + 64 + 16Kbits/sec.)

- primary access : 23 B + D (23 x 64 + 64 + 8 = 1544Kbits/sec. in North America)

or

30 B + D (30 x 64 + 64 + 64 = 2048Kbits/sec. in Europe).

ISDN will make new services and facilities generally available including simultaneous voice and data. It is closer than many users expect and will offer significant benefits to the organization that plans a sound strategy in good time. Most large organizations are wondering today how, or if, they should integrate data and voice. A common conundrum is whether office automation should be based on local area networks (baseband or broadband?) or on digital PBXs, or a combination of both. Information and communication managers should now be considering these issues and incorporating ISDN plans into their overall strategies.

Implementation plans for the ISDN service in some European countries are indicated in figure 2, taken from 1988 study by Scicon for the Commission of the European Communities, which also mentions the percentage of 1988 telephone network loops that will be B channel ISDN connexions. Since some network operators are planning on a year-by-year basis, or in the short-term, many of the future intentions are not yet decided. France, the Netherlands and Portugal have plans through to the mid-90s and beyond.

In its study "ISDN - The Commercial Benefits", OVUM anticipates that, by the end of 1990, the number of primary rate access connections will have grown to 16000 in Europe and over 50000 in the United States - equivalent to 60 % of the installed base of large (over 100 extensions) PBXs.

The standards for the ISDN are well underway in the International Telephone and Telegraph Consultative Committee (CCITT) chiefly the I.xxx and some Q.xxx Recommendations.

The European Telecommunications Standards Institute (ETSI) has embarked on an intense programme at the behest, and with the financial support, of the Commission of the European Communities to hasten the finalization of ISDN standards in the form of NETs (Normes Européennes de Télécommunications).

Nevertheless, because network operators have been keen understandably to procure early equipment and launch trials before the standards have been difinitively completed, there is a danger that detailed differences between the various operators' implementations will create problems.

For this reason on 18th July 1989 the Council of the European Communities resolved (Council Resolution 89/C196/04 published in the Official Journal of the E.C., n° C191/4-6 of 1st August 1989) to strengthen the coordination of the introduction of the ISDN in the Community up to 1992.

The Council Resolution considers the following measures to be necessary :

- acceleration of establishment of common specifications for equipment and interfaces (especially through ETSI) ;
- seeking commitment from manufacturers to the development of standards for terminals and PABXs to guarantee end-to-end compatibility and terminal portability ;
- examine applicability of Open Network Provision ;
- further discussion on privacy protection requirements and communications security in the context of new services.

Several other initiatives are included in this Resolution to try to encourage the rapid develoment of ISDN and safeguard European industrial interests in this domain.

3.5 Satellites

Document delivery services sometimes require more bandwidth and geographical coverage than that provided by existing wide area data networks. ISDN will eventually satisfy these needs, but there will be an extended transitional phase lasting until the early part of the 21st century during which satellite networks will be the most effective means of transmission at narrowband (64Kbits/sec.) or broadband ($\geq$ 2Mbits/sec.) data rates.

The advantages of satellites for telecomms services can be summarized as follows :

- some are already in orbit (e.g. EUTELSAT 1, F1, F2, F4 ; TELECOM 1) and therefore immediately available for operational or experimental services ;
- wide geographical coverage ; e.g. EUTELSAT reaches from Iceland to Turkey and the countries bordering the Eastern Mediterraneous Sea, and Morocco and the Canaries to Finland ;
- broadcast and multicast mode of use ;
- distance-independent tariffs ; and
- high data rates.

These properties suggest that the rôle of satellites will be generally to complement terrestrial networks. The comparative economics of terrestrial and satellite communications is a complex subject. If a network linking all European capital cities, and giving local 2Mbits/sec. access had to be installed from scratch including laying cables, the fact that a satellite is already in orbit and earth stations available, or quickly orderable, makes the latter solution cheaper. And whether or not satellites are used is not only a matter of economics ; they also offer flexibility and security. Also, since they provide transparent digital transmission paths they can be integrated into ISDN planning.

The main telecommunications services for which geostationary satellites are used are direct broadcast television, telephony, and fixed and mobile specialized business data services (e.g. videoconferencing, computer to computer file transfer, document delivery). Until now most revenues to these satellite operators have come from TV and telephony, but a growth in business data services is anticipated in the next few years.

High speed, high quality document delivery for news agencies, advertisers, the legal profession and multinational corporations may become a significant segment of this market.

Nevertheless, a word of caution is called for, when one remembers the experience of Satellite Business Systems, Federal Express Zapmail and Equatorial Communications in the United States.

Satellite networks for document delivery services either have one central hub station near to the source of documents and several or many receive-only stations, or they allow several transmitting stations located near to document sources (archives) and many receive-only stations.

These configurations are well suited to document delivery applications in which one or a few centres are the source of documents to be distributed to many widely dispersed receiving locations. This is not the case for ordinary electronic mail but does apply to publishing, libraries, manufacturer/dealer networks, software distribution, etc...

Considerable economic benefits accrue from the use of receive only earth stations ; microterminals (i.e. very small aperture terminals) are coming down in price as the on board power of satellite

amplifiers and the frequency band they operate in increases. The cost of such microterminals is in the range 1 - 10000 Ecus. However, the regulatory environment is all important for the economics of the services.

The APOLLO (Article Procurement On Line with Local Ordering) system is an example of a multi-hub unidirectional microterminal system. It is designed to use the Satellite Multiservice System (SMS) transponders of EUTELSAT 1 satellites with a user data transmission rate of 1.536Mbits/sec. On the assumption that a 300 pixels per inch A4 page, compressed according to the modified READ algorithm (group 4 facsimile), contains about 1 million bits, approximately 90 pages per minute could be transmitted over the satellite channel.

In outline the system works as follows (see figure 3). One or more document archives are connected to a transmit-side data station controller via leased lines or switched circuits using the X.25 protocol. When it has one or more requests to send a document, the data station controller calls the satellite access controller which implements a reservation on-demand, multiple access protocol to acquire use of the satellite channel via the transmit/receive SMS earth stations. There can be a number of transmit-side data station and satellite access controllers. For obvious reasons the access protocol works best for large file transfer.

On the receive side, the receive-only microterminals and data station controller can service : either a closely bound document terminal ; or a document terminal connected to it via a local area network or an X.25 line ; or several such document terminals connected via X.25 lines. The most economical arrangement is a closely bound document terminal or one connected via a local area network when the entire receive chain can be located on the user's premises but this depends on regulatory conditions.

A feature of all designs including receive-only terminals is that data communication is connexioniess i.e. the receiving machine cannot report back in a continuous way any errors it detects. This is a disadvantgae if the bit error rate exceeds a small figure, say 10^{-6} . Such a figure is achievable 99 % of the time in the 12/14 GHz band of SMS whithout too much difficulty.

A backward channel from the receiver to the transmitter can be achieved where necessary via terrestrial networks.

4. Standards

Since document delivery is required between organizations which have different suppliers of computer systems, standards are essential for the interworking of the equipment.

The architecture of systems should conform with the 7-layer reference model for open system interconnexion (OSI) of the International Standards Organization.

The protocols for network communication (layer 1-3) are standardized already ; those for the intermediate layers 4, 5 and 6 are well known.

As computer technology has advanced we have now reached the point where nearly all terminals will be fully-fledged computers with good processing and storage (as well as communications) capabilities.

For this reason the OSI application layer 7 is being embedded in the client-server model for ensuring interworking between application processes in separate computers. A key part of this development is the so-called Distributed Office Application Model.

Thus, a general model of the application layer exists.

Some application entities such as a File Transfer Access and Management (ISO 8571), Directory (ISO 9594, CCITT X.500) and Message Handling System (ISO 8505, CCITT X.400) are well defined.

Others of importance for document delivery such as Remote Database Access, Document Filing and Retrieval, and Office Document Architecture have yet to be completed.

It is expected that :

Distributed Office Application Model (DP 10031)
Document Filing and Retrieval (DP 10166)
Remote Database Access (DP 9579)
Office Document Architecture (DIS 8613)

will progress from draft proposal to draft international standard stage in 1989 and become international standards in 1990.

International standards' specifications for computer interworking are necessaly complicated documents Usually there are optional parameters in these definitions. Implementors can therefore produce products that are not completely compatible although each conforms with the standard.

To overcome the problem several bodies in the European Community, notably the European Workshop on Open Systems (EWOS), are working on the definition of functional profiles which comprise clearly defined protocol stacks for services. This work is a valuable contribution to ensuring computer interworking in specific areas.

An example of the work of EWOS relating to Office Document Architecture is the ratification of the following document application profiles.

(a) C.121 Provides for the interchange of simple character only documents between message handling systems. Logicaly the documents contain a sequence of paragraphs with no layout information ; formatting is the recipients' responsibility.

(b) Q.111 Provided for the interchange of documents with character content between basic word processing systems. Logically the layout consists of single columns of text in pages with the possibility of headers and footers. Various layout and presentation parameters can be applied to each paragraph.

(c) Q.112 Provides for the interchange of multimedia documents between extended document processing systems within an integrated office environment. Docuemnts may contain characters, raster graphics and geometric graphics. Logically the document may be considered to be a hierarchical tree of segments representing chapters, sections and nested sub-sections.

5. Conclusions

Documents have been considered as a broad range of entities that hold permanent information for the purpose of transferring knowledge between humans. Their structural variety is complex, but information technology and the definition of standards is steadly evolving towards the time when document preparation and local management will become more efficient.

A range of telecommunications networks and services exists for document delivery. As ISDN is introduced through the 1990s and beyond, and satellite microterminals come down to utility prices in the 1990s it can be anticipated that these technologies will complement each other in the provision of a new range of economical and flexible services for disseminating the information contained in documents.

The completion of the standardization proc ; relating to data interchange between computers will be a crucial step in the near future towards more ; ient document delivery.

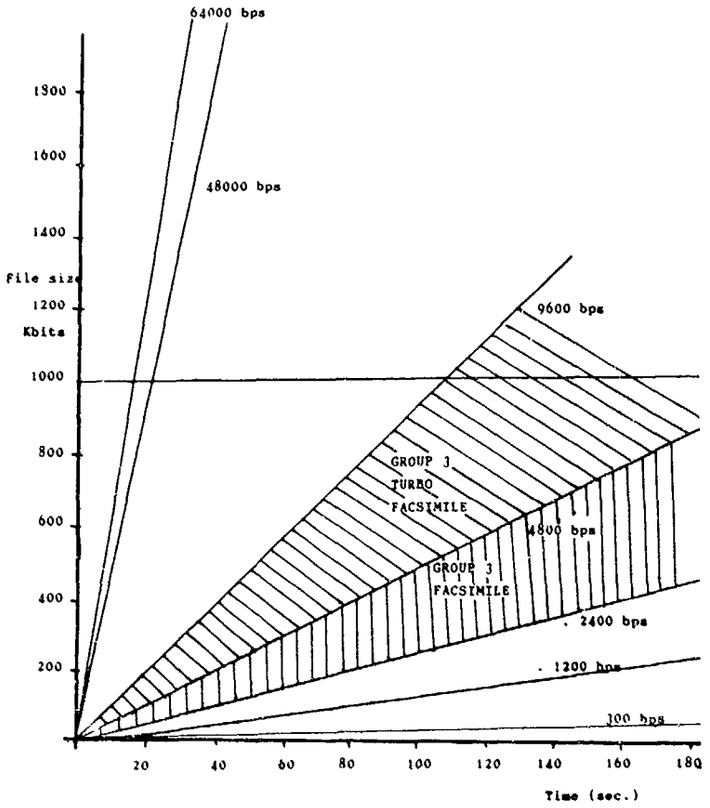
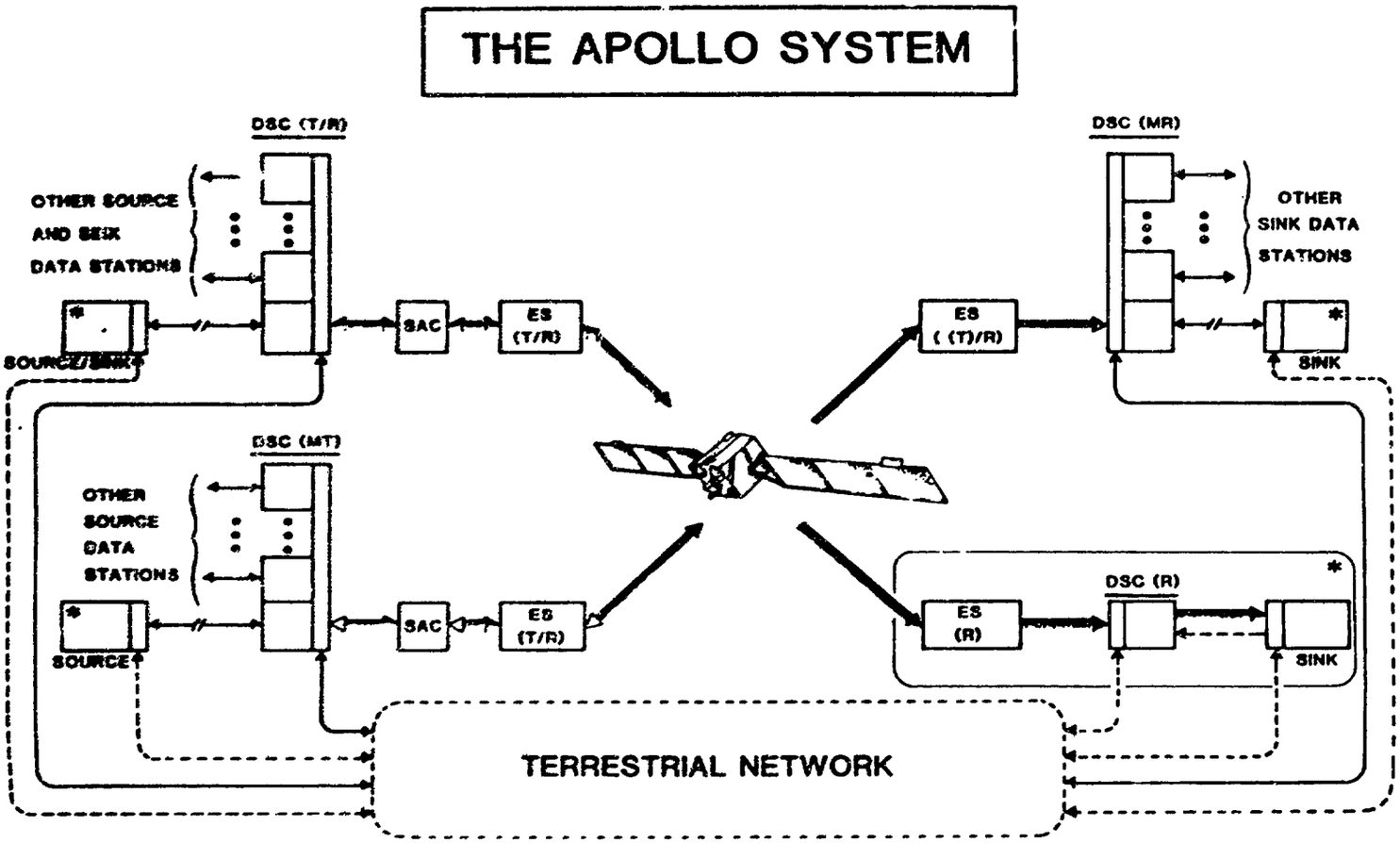


Fig. 1. Plot of file size vs transfer time showing the effect of changing data transmission rates.

ISDN provision	1988	1989	1990	1991	1992	1993	% 1993 PSTN subs
GERMANY exchs B-CHAN	8 16000	108 176000	246 246000	385 nd	507 nd	628 nd	1.00 %
FRANCE exchs B-chan	5 2600	9 10000	800 50000	850 160000	850 400000	850 900000	4.10 %
NETH'LANDS exchs B-chan	- -	- -	2 1000	6 5000	25 25000	100 85000	1.50 %
UK BT exchs B-chan	500 10000	1000 nd	1500 nd	nd nd	nd nd	nd nd	-
ITALY exchs B-chan	7 4000	7 4000	7 4000	nd nd	nd nd	nd nd	-
BELGIUM exchs B-chan	- -	3 2000	3 2000	nd nd	nd nd	nd nd	-
PORTUGAL exchs B-chan	- -	- -	6 2000	nd 6000	nd	nd	10 %

Fig. 2. ISDN implementation plans of network operators
(Source : Scicon 1989)



* Equipment on the premises of the user

Figure 3. Schematic diagram of a multihub satellite network for large file transfer (e.g. document delivery)

THE WEAPONS LABORATORY TECHNICAL LIBRARY: AUTOMATING WITH "STILAS"

by
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SUMMARY

In 1983, the United States Air Force Weapons Laboratory Technical Library formally recognized the requirement to manage its large diversified collections by automating several functions. This awareness coincided with the initiation of a joint Library of Congress-Defense Technical Information Center procureement program for an advanced automated library system to serve the sophisticated needs of Department of Defense scientific libraries. Prototypes for the DTIC-sponsored project were described in the literature as the "Local Automation Model." The Weapons Laboratory agreed to install the first production version of the system that was renamed the Scientific and Technical Information Library Automated System (STILAS). STILAS incorporates the features of an integrated library system with gateway reference access to an assortment of remote data bases, allowing library staff members and end-users to access up to four data base systems simultaneously. In addition to this reference function, STILAS performs all of the traditional library management functions of circulation, serials control, acquisitions, and inventory control. STILAS access is provided to Kirtland Air Force Base and its tenant organizations.

SYSTEM DEVELOPMENT

In 1981, as part of an effort to maintain currency with library technology and increase access to technical documentation, the Defense Technical Information Center (DTIC) initiated a program known as the "Local Automation Model" or "LAM." The intent of the LAM project was to develop a prototype integrated automated system to be used by Department of Defense (DOD) libraries and information centers. The system envisioned would allow for increased access to the rapidly expanding government and contractor-produced technical literature. While providing greater access for research purposes, the system would also encourage wider participation in DTIC's Shared Bibliographic Input Network SBIN). The SBIN program, originally designed to facilitate growth of the DTIC on-line data base, had been suffering from a lack of participation due to the redundancy of enter-

ing cataloging records for local publications in a local catalog as well as into the DTIC system. (Hamilton, 1983.)

The desire to eliminate duplicate effort in loading records in two separate systems was widespread among DOD libraries which participated in a 1981 DTIC survey and needs analysis. Other concerns expressed were the need for complete automation of all library functions and enhanced capabilities for uploading and downloading records from the DTIC Defense R&D On-Line System (DROLS). The Weapons Laboratory (WL) Technical Library was among the respondents seeking integrated in-house automation of its many functions.

Our 1983 decision to automate coincided with the development of the functional specifications for the LAM prototype. As refinement of the specifications progressed, DTIC was joined by the Library of Congress (LC) in its effort to develop a system suitable for use in federal libraries. The joint effort by DTIC and LC focused on an effort to combine off-the-shelf hardware and software which would meet the prototype requirements. (Hamilton, Sept. 1984.) A key factor in doing so was the development of a single library system which could be sized (small, medium, and large) to meet the varying needs of federal libraries and information centers. In a study of the most acceptable library systems available, two versions of the LAM prototype were tested in early 1986. The small version, MicroLAM, was tested at the Army Training and Doctrine Command Headquarters, Fort Monroe, Virginia, while the full-scale large system configuration was tested at the Defense Nuclear Agency in Virginia. Prototype testing analyzed the ability of the system to handle the three primary types of library data, bibliographic, patron, and fiscal, in performing the core library functions of acquisitions, cataloging, circulation management and control, and reference.

The LAM prototype tests resulted in the release of a competitive Request for Proposal (RFP) from LC in September 1987. The RFP called for the production of an integrated library system meeting the specifications derived from the prototype experience. Copies of the RFP were issued to over one hundred vendors. A panel of federal librarians and computer experts selected three vendors to perform operational capability demonstrations (OCD) of their products in the spring of 1988. Of those conducting the OCDs, SIRSI Corporation of Huntsville, Alabama passed with flying colors. As a result of the panel recommendations, LC awarded a production contract to SIRSI in September 1988. Renamed the "Scientific and Technical Information Library Automation System" or "STILAS," SIRSI offered the production version of the DTIC-LC developed system for purchase on LC contract J70065. The WL Technical Library agreed to acquire the first production version of the system and sent the necessary funding documents/task order for a large version of the system to LC in October 1988.

A small business specializing in library automation, SIRSI was founded in 1979 by library and computer specialists, and has a strong reputation based upon the success of their UNIX-based Unicorn Collection Management System. SIRSI offers a complete support package for their systems, including pre-installation site analysis, data preparation and loading, tailored system configuration, 24-hour telephone hotline support, system upgrading, and special supplies and equipment, including barcode labels and scanners.

STILAS FEATURES

STILAS is a turnkey system based on the Unicorn and BRS/Search systems. The contracted STILAS package includes UNISYS hardware, software written in the C language running on the UNIX 5.3 operating system, full system installation and support, and a comprehensive training package. The large configuration ordered by WL features sixteen workstations linked to a UNISYS 5000/95 supermini computer. Not merely terminals, each of the workstations is a powerful personal computer (PC). The PCs actually preprocess operator commands before they reach the host computer, thus increasing system speed and versatility.

STILAS offers an integrated data base built around the library catalog. It is an easy system for both library staff members and patrons to learn and use. Color-coded engraved function keys are used to enter commands in a verb-noun format. Context driven customized help screens also simplify use. The intelligent PC workstations allow for alternative means for completing single functions, permitting idiosyncratic work patterns. Screen formats are tailored to various library work areas. The modular structure of STILAS is not unlike that of the integrated library systems which have been available for the past several years. STILAS is unique, however, in that it is specifically designed for science and technology libraries. The distinction lies in the fact that it is far more than an integrated system, and is actually an "open" system which permits end-users to perform much of their own searching across a spectrum of remote data bases while simultaneously searching local library files.

The public catalog module permits full text searching using BRS based commands to search for keywords in any record field with Boolean operators, truncation and positional features. Additionally, novice and expert search modes are supported with imbedded help features. Local catalog searching provides the status of all materials, whether on order or in the library collection, with records displayed in a variety of abbreviated and full formats. Closely linked with the catalog module is the circulation control module. It features a mechanism for validating security clearance levels for both library materials and patrons before the materials are circulated. Akin to this feature is the printing of receipts for patron signature whenever classified materials are circulated. Standard circulation functions of producing item holds, recalls, overdue notices, and statistics as

well as mailing labels for interlibrary loan (ILL) items are also provided.

The most unique aspect of STILAS, and the one distinguishing it as an "open" system, is its capacity to serve as a "gateway" to multiple data bases on remote computer systems. While computer networking provides a communications link between various automated systems, gateway technology facilitates networking by masking the incompatibilities of the various systems. (Jacobson, 1986.) The STILAS gateway permits simultaneous interaction over a variety of links with data bases such as DTIC, DIALOG, BRS, or NASA Recon, while also searching the local files. All communications protocols are stored within the STILAS system, allowing searchers to link with remote systems through auto dial/auto log-in direct modems which are connected to the host computer. These multiple links allow users, whether library staff members or patrons/end-users, to access remote data bases in either of two modes. In the native mode, users have full access to each data base system individually, employing the command language/structure peculiar to that system. While in the native mode, users have the option to capture search results or to switch to the universal access mode at any time during their search. The universal access mode permits searching in up to four systems simultaneously using a universal command language. Each search statement must be formulated only once; STILAS will translate the statement into the appropriate forms for each data base being searched. The universal mode permits all common search features of varying display formats, sorting, data capture/downloading, and postsearch processing.

The universal access mode is made possible by the Retrieval Interface Manager (RIM), which is unique to STILAS. RIM provides the universal interface to disparate data bases by providing STILAS users with a common command language for searching. Essentially, RIM is a translator, converting STILAS commands in a format based upon BRS/Search, into the formats required for other systems. RIM performs this function not only for searching but also for data entry and modification (uploading), data capture (downloading), and reporting. Additionally, both uploading and downloading may be performed as a background function while the the user is conducting other transactions on the system. Data formats are translated into a single STILAS format so that search results are uniform in appearance, easing user evaluation of the results. RIM also facilitates searches by storing session histories, permitting the reexecution of searches, and by allowing the modification of stored searches. The downloading and universal format options available via RIM provide the capability of preparing customized, merged bibliographies extracted from multiple data bases. Another STILAS advantage, due to RIM's versatility, is that training time required to learn the peculiarities of multiple data base systems is significantly reduced. Users need only learn STILAS. Also, locally significant or frequently required research files can be maintained as STILAS searches for quick execution when needed. Simultaneous uploading into multi-

ple files is also possible with RIM. This feature fulfills one of the original DTIC desires of providing an easy mechanism for increasing SBIN participation by eliminating duplicate record entry. STILAS uploading also permits entry of work unit records into the local catalog, facilitating internal tracking of local report production/publication.

While the gateway reference functions made possible by RIM are the most distinctive features of STILAS, the other library functions of acquisitions, cataloging, serials control, and academic reserves are all modules of the system. Within the acquisitions module, complete tracking of desired materials is possible through all stages of selection, ordering, claiming, receiving, and processing. Full fund accounting information is maintained by STILAS, with options for producing purchase orders and automatic claims to vendors. A variety of statistical and financial reports can be prepared at any stage of the acquisitions process. During this process, item status is continually available in the public catalog. Also, a useful feature is that of building a vendor file, storing data on funds expended with a particular vendor, claim histories, and multiple vendor contacts and addresses.

The STILAS cataloging module accepts downloading of records in a variety of formats (Committee on Scientific and Technical Information [COSATI], On-Line Computer Library Center [OCLC], other Machine-Readable Cataloging [MARC], etc.), either on-line or from archival tapes or Compact Disc-Read Only Memory (CD-ROM), into the local data base. Original cataloging, for local and uploading purposes, is facilitated by the use of templates or workforms employing default values for locally specified fields. Data is validated for both uploading and downloading transactions. Multiple authority files may be built for any fields which the local situation requires. The authority files, author, subject, or series, can be searched or browsed on-line during the cataloging and catalog maintenance transactions. The authority files of systems such as OCLC may also be searched during the cataloging process via the RIM interface. The cataloging records built form the basis for item records representing additional copies and volumes held.

Multiple item records built upon a single cataloging record are the cornerstone of the serials control module in STILAS. All holdings are displayed in the public catalog for both hardcopy and microform materials. Missing issues are automatically claimed. Claiming information as well as next issue expected delivery dates are displayed to users. As each has a unique item record in STILAS, all issues of all titles may circulate, as local policies allow. The optional academic reserves module also displays information to all users regarding the nonavailability of certain materials for routine circulation. This module includes all the controls of the circulation management module,

with the addition of printed reserve lists for easy reference. As with all other STILAS modules, complete, locally customized statistical reports are available.

To complete the STILAS package, SIRSI provides full support of STILAS with upgrades loaded directly into the local system via a dedicated telephone link. This link is also maintained for troubleshooting system problems and conducting routine system maintenance and analysis.

LOCAL CONSIDERATIONS

The WL Technical Library installation of STILAS required some modification of the existing space in the Technical Processing Section to house the hardware. The UNISYS 5000/95 is acknowledged to be a system needing minimal "babysitting" in a typical office or library environment. To complete the WL installation, however, a heavy duty air conditioner and an uninterruptable power supply (UPS) were both added to the existing room. Extra electrical circuits and 24 telephone lines were installed to accommodate the gateway links and off-site user dial-in. These renovations coincided with those required to install a magnetic strip activated book security system in the Library. The project to apply the security strips was conducted in conjuction with that of applying barcode labels to all materials in preparation for automated circulation with STILAS. This effort, requiring the physical handling of every item in the Library's collection also permitted a full inventory. The inventory was a valuable means of verifying that all titles were loaded into the system from the first batch of archival tapes. Such inventories, as well as usage studies will be conducted much more efficiently in the future using the barcode labels and portable laser scanners.

Future expanded use of STILAS in the Technical Library will necessitate refinement of some present policies and procedures. Factors relating to operations security, computer security, and communications security require further analysis. In particular, the adoption of the Low-cost Encryption and Authentication Device (LEAD) is expected to have a considerable impact on system use and operation. Other concerns may involve Privacy Act issues as related to patron identification stored in the system and the possibility of user fees to recoup some of the communications costs incurred via the gateway features. The cost of system use will be of special interest as more and more patrons will be able to perform searches from their offices using STILAS. They will be able to connect to remote data bases through the STILAS host via the Weapons Laboratory's Local Area Network (LAN) without ever having to visit the Library. At present, there is no accurate means of predicting the amount of "dial-in" usage of the system. Perhaps several years will have to elapse to fully evaluate the levels of system use by various segments of the patron population accessing STILAS by the many available means.

CONCLUSION

The Technical Library's implementation of STILAS is an important milestone in an ongoing program. It completes the developmental phase of a sophisticated library system designed to meet the research needs of federal scientific and technical facilities in the United States. Successful installation of STILAS at the Weapons Laboratory marks the beginning of a new period of strengthening the federal library network. Libraries acquiring STILAS will be able to easily search each others' systems as a means of accessing and sharing unique resources. (Cotter and Hartt, 1986.) The future beyond STILAS-linked libraries is even brighter. STILAS may become the foundation of the NATO Scientific and Technical Information Service (NSTIS) proposed in 1986. (Molholm, 1987.) In any event, STILAS has found a home in the Weapons Laboratory, where it has revolutionized every facet of Technical Library operations.

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THE AUTOMATION PLAN OF THE GENERAL DIRECTORATE 1 (SEARCH) OF THE EUROPEAN PATENT OFFICE

by

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Abstract

The European Patent Office is actually realising a huge automation project corresponding to an investment of about 300 Million DM.
This project is undertaken to cope with the ever increasing number of patent applications and volume of documents to be searched.
The automation effort will be conducted in three directions.
- processing of textual information (Epoque)
- processing of images (Bacon)
- personal Systems

1. The EPO

The European Patent Office (EPO) was founded in 1978 to rationalise the granting of patents within the territories of its 13 Member States.
The European Convention (EPC) establishes an organisation to implement a single procedure for the searching and substantive examination of European patent applications. The EPO is the executive body of that organisation.
Directorate General 1 of the European Patent Office (EPO) is established in The Hague and Berlin and is responsible for receiving applications for European patents, and for searching the patent and non-patent literature for documents which are relevant to the application.
The overwhelming majority of this literature is held as printed documents and this is leading to acute problems of storage and access.
The EPO/DG1 therefore initiated a long term plan to automate the storage and handling of information using computer technology, which will be fully implemented towards 1993.

2. The search documentation of the EPO

The following tables give a general idea of the content of the systematic documentation. It should be noted that documents are normally filed in the search documentation according to the classification given by the examiners in Directorate-General 1, with the exception of abstracts in English of patent documents issued by Japan and the Soviet Union, and abstracts Journals such as Chemical Abstracts, Derwent etc.

Table 1 COMPOSITION OF THE SYSTEMATIC DOCUMENTATION

PATENT DOCUMENTS	Countries	from	Code
P	FRANCE	1900	FR
C	GERMANY (Fed.Rep.)	1877	DE
T	UNITED KINGDOM	1909	GB
	UNITED STATES	1920	US
M	SWITZERLAND	1920	CH
I			
N	Without foreign priority	With abstracts in English	
D	CANADA 1970 CA	JAPAN	JP
O	AUSTRALIA 1971 AU	SOVIET UNION	SU
C	AUSTRIA 1971 AT		
U	EP		
M	published European	22 Dec. 1978	EP
E	patent applications	N° 0 000 001	
N	PCT		
T	published international	19 Oct. 1978	WO
A	applications	N° 78/00001	
T			
I	OAPI	N° 1	OA
O	ARIPO	N° 1	AP
M			

Other countries BE 1926 - LU 1946 - NL 1912 - SE 1984

Table 2 **Search Files - Yearly increase**

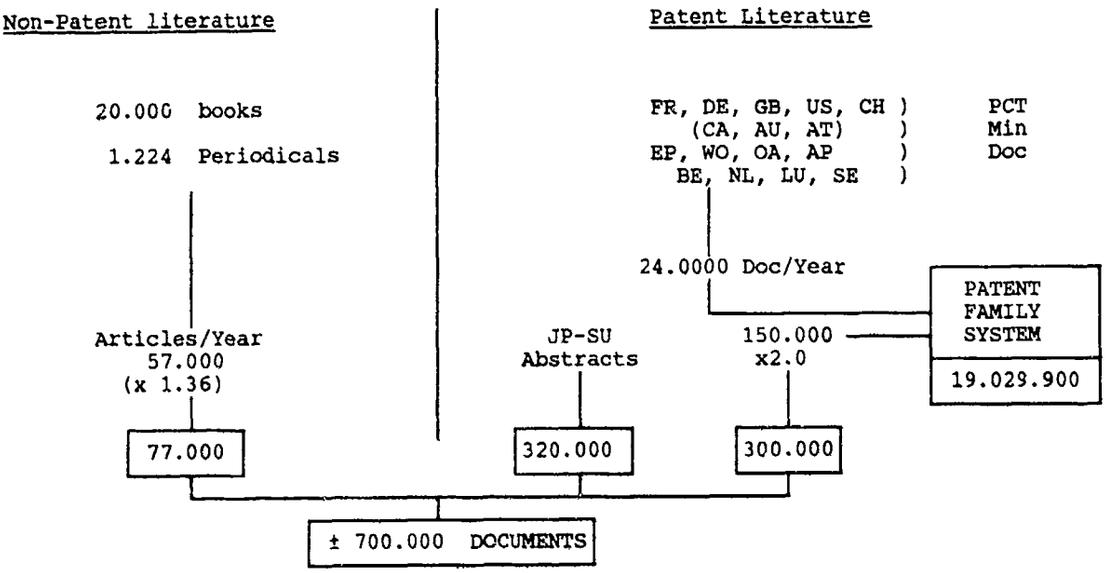

Table 3

Documents physically arranged in the search documentation

	Patent documents	Articles	Abstracts JP/SU	TOTAL
Total end 1987	14.455.920	1.621.165	2.468.234	18.546.319
Increase 1988	407.393	77.816	416.102	901.311
Removed in 1988	- 73.800	- 0	- 1.057	- 76.857
TOTAL end 1988	14.789.513	1.698.981	2.882.279	19.370.773

Table 4

Documents included in the systematic documentation

	Patent documents	Articles	Abstracts JP/SU	TOTAL
Total end 1987	18.412.600	1.621.165	2.512.497	22.546.262
Increase 1988	617.393	77.816	416.102	1.111.148
TOTAL end 1988	19.029.830	1.698.981	2.928.599	23.657.410

3. Access to technical information in the systematic documentation

The documentation is organised primarily with a view to manual documentary searches by means of a classification system.
Any such system must allow the documentation to be subdivided into small groups as demanded by the subjects currently searched. Every document is represented in the search files in one or more copies depending on the number of technical subjects it contains.

However, in many fields of technology the documents often contain complex information, access to which has to be organised using coding systems and auxiliary search means.

3.1. Access by classification system

International Patent Classification (Int.Cl.)

The internal classification used in Directorate-General 1 is basically constructed on the lines of the hierarchical structure of the Int. Cl. It also contains a large number of internal subdivisions grafted onto official subgroups, increasing the number of subdivisions by something in the order of 50 - 60 %.

An example of how the further subdivisions are included is to be seen in the next table.

Table 5 Epo Internal Classification

B60S	SERVICING, CLEANING, REPAIRING, SUPPORTING, LIFTING, OR MANOEUVRINGS OF VEHICLES, NOT OTHERWISE PROVIDED FOR
	[N: WARNING:
	1. This subclass was introduced on January 1st, 1975 together with the closing of the old classification scheme (IdT) 63C
	2. Patent documents are continuously being reclassified from the closed IdT scheme into the IPC scheme
	3. General concordancy IPC to IdT groups is as follows:
	B60S 1/00-1/66 : 63C91 63C9188-63C91B9G3 63C100H2
	B60S 1/68 : 63C28
	B60S 5/00-5/02 : 63C110-63C110D
	B60S 9/00-11/00 : 63C105F3 63C105H2P
	B60S 13/02-13/02: 63C110 63C110B 63C110C]
	NOTE
	Attention is drawn to the Explanatory Note following the Class title (B60)
1/00	Cleaning of vehicles (by apparatus not integral with vehicle 3/00; cleaning in general B08B; de-icing of aircraft B64D)
1/02	. Cleaning windscreens, windows or optical devices
1/028	. . [N: including defroster or demisting means]
1/02B2	. . . [N: using electrical means]
1/04	. . Wipers or the like, e.g. scrapers
1/04B	. . . [N: completely or partially concealed in a cavity]
1/04B2	. . . . [N: the cavity being equipped with a movable cover]
1/04D	. . . [N: Means for influencing the aerodynamic quality of wipers, e.g. clip-on wind deflectors (1/32 takes precedence)]

The implementation of the Int. Cl. has been accompanied by the reclassification of all the backlog in those fields in which such investment was justified by search activity. In the other fields the Int. Cl. is used as from a given date and in principle documents filed prior to that date remain filed under the I.d.T. classification (old Dutch Classification). However, in the process of carrying out searches examiners remove backlog documents and reclassify them under the Int. Cl. system. (± 400.000 per year).

About 2.400.000 documents are still classified according to the I.d.T. schemes.

Table 6

Int. Cl. System	
(a). all reclassified	47.326
(b). from a certain date	47.967
sub-total :	95.293
IDT-NL System	
(c). for new documents	2.605
Grand total :	97.898

(d). Closed backlog : 1988 : 17.023 OEB - NL subdivisions

3.2 Access to the documentation by other internal systems

Clearly, classification systems do not provide the solution to all problems of access to information contained in patents. Technological information contained in patents in fact varies from simple information to the most complex information.

Indexing systems

The search examiners of the EPO have at their disposal two types of indexing systems: "deep" and "light" indexing systems. The deep indexing systems are real search tools which constitute in the technical fields where they are used the primary search tool. The light indexing systems are search "aids": they offer the examiner a supplementary access to his documentation, the main search tool being the manual search documentation.

Deep indexing systems

A few of the former ICIREPAT-type systems are in use in the EPO (formerly the IIB) for more than 20 years. In the beginning they were available as "Batch" searching systems, first on punched cards and later on computer. The systems are presently available as on-line searching systems.

The average number of indexing terms per document is about 10 to 30, depending on the technical field.

No new deep indexing systems are presently being developed in the EPO.

Light indexing systems

CIS systems

These systems make use of indexing symbols consisting of Int. Cl. symbols including internal subdivisions introduced at the EPO. Each document entering the system receives, besides the normal classifical symbols, two possible kinds of indexing symbols:

- supplementary information i.e. symbols indicating secondary aspects which are useful for search purposes
- complementary information, i.e. symbols completing the information about a subject already classified as such.

The CIS concept was introduced in the EPO about 10 years ago. The CIS systems were first available as computerised batch searching systems but are presently offered, like the above mentioned deep indexing systems, as an on-line service.

The average number of indexing symbols per document is about 2 to 10, depending on the technical field. It should finally be mentioned that the extra CIS symbols, as they are written on the documents, are available for direct interpretation during a normal manual search.

ICO systems

The ICO ("in computer only") system, recently introduced in the EPO, is still "lighter" than the CIS System; it is available for use in all technical fields and it is expected that the average number of indexing symbols per document filed in the search files, will be about 2. The ICO indexing symbols are available on-line (together with the normal classification symbols) via the INCO ("inventory combination") system.

The layout of the ICO symbols is similar to the structure of the IPC symbols, but to facilitate identification, the Section symbols A through H are replaced by the letters K, L, M, N, P, R, S, T and the oblique stroke is replaced by a semi-colon (;).

4. The Automation Plan of DG1

Why automation ?

- The volume of documentation to be searched is continually expanding; more than 20 million documents in DG1's collection with an annual increase of 700.000 new documents, both patent and non-patent literature.
- There is a need for searching tools using keywords or full text techniques that complement the use of IPC based systems.
- The on-line market is expanding, external databases covering scientific and technical literature will be more extensively used by the Office.
- The productivity of the examiner's work should be improved, despite the growing number of documents to search.
- Automation should lead to a better search management, simplify procedures, and integrate operations.

Basic principles

- Automation has to benefit the examiners, these are deeply involved in the design of the systems.
- Automation must be progressive (no abrupt change), flexible (needs vary form one department to another), reversible (some systems are disappointing), upgradable (open to the future)
- Automation must be personalised so that the examiner can combine conventional and automated search tools to fit his way of thinking and working.
- Automation goes with an increased intellectual support for ensuring the high quality of data files
- Automation will be conducted in three directions:
  - processing of textual information
  - processing of images
  - personal systems

Processing of textual information

The main project EPO is dealing with in this field is the establishment of an internal host computer service (project EPOQUE - EPO QUEry) loaded with the internal databases used presently by the examiners (FAMIly, INVEntory, Classification) and extensively used external databases (DERWENT, INPADOC).

The objectives of this project are to impact on
- the quality of searches: easier access to an augmented number of databases
- the productivity of the examiners work: faster access to the information

Also EPOQUE will cut the costs of internal databases access.
EPOQUE is essentially a powerful high level retrieval software with the most advanced features: crossfile searching (among different hosts) cluster searching, on-line help, thesaurus management, search strategy saves, ..

The user interface will be such that all external, internal and personal databases will be accessed by the same query language (query language translation function); also the most used data (patent numbers, IPC codes, ...) will have the same format (data format conversion function).

Part of EPOQUE software will be installed on the examiners IBM PS/2 workstations to implement some of the above listed functions and take full advantage of uploading, downloading and personal file management capabilities. EPOQUE will require a mainframe power of 30 Mips, and a disk capacity of 60 Gbytes to serve up to 500 simultaneous users.
The total investment, software and hardware will be about 22 million DEM.
The first version of EPOQUE has been installed in May 1989.

Processing of images

For searching

Having an easy access to textual information is an important step in the automation process. To achieve a search, an examiner needs however most of the time to consult the graphic elements - drawings, figures - contained in the patent documents.
The project BACON aims to give access to both image and text of patent documents; it consists of two main steps:

. capture of the documents
. storage and use of the files

The capture of the documents consists, on the EPO side, in capturing the 65 million pages representing the first published patent documents of EP, WO, CH, GB, FR and DE (starting 1920). The contract for scanning these documents and storing the facsimile data on magnetic tapes has been awarded in 1986. Within the framework of the Trilateral Cooperation the USPTO and the JPO are in charge of capturing the data for respectively US and Japanese patents. The resulting magnetic tapes will be exchanged so that a complete collection of the PCT minimum documentation (125 million pages) will be available.
Those documents in facsimile format will then be transferred to a direct access storage medium, most likely digital optical disks.

The BACON database should then be used in different ways:
- a centralised file organised in numeric sequence which will serve for electronic document delivery (direct display on the examiner's PC screen, or making copies using high capacity laser printers).
- at decentralised level, files organised in sequence of classification for searching purposes. These files could be stored on updatable optical disks (WORMS), these disks being part of the documentation groups and coexisting with paper documents.

The first step - capturing of data - is in progress and the whole volume of data will be available on magnetic tapes by the end of 1990.
The study of the second step - use of the data - will be initiated in the coming months. To gain experience im image handling the EPO launched the JIMA pilot project, which consists of displaying on specialised workstations the text and images of the Patent abstracts of Japan.

About 1.400.000 images are loaded on a central optical disk storage (12 Gbytes) to cover all the data from 1980 onwards. The textual information will be retrieved from a database loaded internally under STAIRS/AQUARIUS.
The JIMA system is actually in operation and corresponds to an investment of 2,9 million Deutsch Marks.

For administration

Another aspect of the use of facsimile data within the DG1 is the ELFOS system which will be installed for the Receiving Section.
The Receiving Section manages the administrative communication with the patent applicants, and handles more than 5000 dossiers a day (new cases, or cases in progress). Each dossier consists of about 25 pages and has a lifetime of 3 years.
The idea is to improve the work of the Receiving Section by means of a better dossier handling system: each dossier will be archived, but the "live" part of it will be stored on upgradable optical discs (WORMS) for an easy and fast access by the formalities officers.

The ELFOS system will allow to scan the incoming mail on two specialised scanning workstations. The Facsimile data will then be stored on a central optical storage (Jukebox capacity of 64 discs) and accessed by PS based workstations (high definition screen, laser printer).

The ELFOS pilot system with 4 workstations is also operational, the investment being 3,6 million DEM (including a similar system for Directorate General 2 in Munich). The successful experience of ELFOS will lead in the future to install a full scale system comprising 150 workstations (Munich, The Hague and Berlin Offices) for handling 100.000 dossiers/year.

Personal systems

Some information needed by the examiner have to be processed locally and specifically. Each examiner must therefore have some processing power available via Personal Computer equipment.

The needs are the following:
Easy access to internal and external databases.
In the scope of the next three years, each examiner will spend about 1 hour on-line for each dossier. His workstation (IBM PS/2 type) will be connected to the EPOQUE system for access to databases.

Ability to build and manage personal files
The examiner will be able to download data from external or internal sources, and to manage this data with appropirate software (EPOQUE workstation program, or general use database management software), This will be particularly used for building up data in his specialised field of search.
Also, he will be able to read the CD-ROM discs now currently marketed in many scientific fields.
Use customised in-house application
One example is the CAESAR application (Computer Assisted Editing of Search Report) which allows the examiner to build his search report with his personal workstation. By a succession of menus and screens, the examiner enters, in a very easy way the relevant data he has found during his search (references of patents, applicant, claims ...) or of non-patent literature (publication title, author, date ...).
CAESAR interfaces then with the central mainframe for checking the validity of the data, prints the search report, and updates the internal management files.
CAESAR is operational in two search divisions (50 persons) and will be expanded in the coming months to all examiners.
Communication
An electronic mail and agenda management (IBM PROFS System) has been installed on our mainframe and will be accessible by all examiners.

To achieve these goals the DG1 has undertaken the acqusition of PCs on a large scale, 400 of them are already installed and in a scope of two years all examiners will be equipped (almost 500). These personal systems are linked to the central mainframe via a Local Area Network (Token-ring).

Conclusion

The automation plan is an essential issue for the Directorate General 1 of the EPO. About 300 million Deutsch Marks will be spent in the next 8 years - investment and operating costs to give powerful tools to EPO examiners. The expected benefits are a gain in productivity, an increased quality of searches, a higher motivation of people will render this plan beneficial.

DESK TOP PUBLISHING – WHAT YOU NEED TO KNOW

by

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Foreword

Desk Top Publishing has become one of those marketing "buzz" phrases that has made everyone feel that they need to have it, without sometimes really knowing what it is they want. Then, when get it they often do not obtain the benefits that they thought they would, and often find that the original problem was not the *real* problem anyway.

The traditional publisher has through experience many of the answers, but all too often they have been cast aside, either by themselves with continuation of outdated practices, or sometimes by others that assumed that they had outdated practices. I hope through this document to pass on some of these 'experiences'.

Apple Incorporated through Lisa and then Macintosh are very often attributed with the advent of Desk Top Publishing, but in truth if any one company deserves some credit it must go to Xerox who through its Pala Alto Research Centre in California bought forward the age of the WIMP environment. Windows, Icons, Mouse and Pointers made possible the interesting Desk Top Publishing applications available on the market place today, and though often, but not essential, technologies for the successful DTP venturer. They were also responsible for Xerography, upon which laser printer technology was based. Laser Printing has allowed, and even required applications that can fully exploit the technology.

This paper aimed to give the widest possible view of Desk Top Publishing, given the restriction on time. Not to give all the answers, which in these few pages is impossible, not to restrict itself as in so many DTP books to one minor system, but to put into the readers a sense of how large and potentially exciting the technology and subject is.

That is not to say that DTP always have to make enormous investments to get started, indeed they do not, but any investment they make should not disbar them from growing the system needs as and when they require to do so. If through this paper people want to learn more about the subject, it would have succeeded.

The document also aims to begin a checklist in peoples minds of the important points to be considered before purchasing systems, even simple systems.

Introduction

What is Desk Top Publishing? If you ask that question it is like asking what the weather is going to be tomorrow. There are so many different ways that the original question will be answered. To some it is a brand name, "you mean that product called Apple", to others it's,"well we want to produce a newsletter so we need Desk Top Publishing." Most will say it produces better looking pages and that it produces *professional* looking documents. Few will really see what is behind this 'professional' comment.

In the last chapter of this document we talk briefly about typography as an art. In a way we should have started with that as a subject as since birth most of us have been customised to the art of communication. To communicate by the written word, by pictures, by voice has been a constant pressure in our lives, yet few will really understand the 'art' behind the method.

Do you really read words, letter by letter; the answer is normally no, you often recognise a pattern. Cover the bottom half of a typeset line and you will still reach 90+% accuracy from the readers. Hold up some documents and the audience will be fairly accurate in understanding what audience the document, page, advert have been targetted aimed to. Documents also have a 'fashion'. Hold up a Poster produced in the 1950's and most will tell you with some accuracy its age.

Desk Top Publishing doesn't end there, it's just the beginning. Not only more effective, but lower costs resulting from less paper, capture of information electronically, ability to edit. The list grows and grows.

Is this important to us? The answer must be yes, because information is the way we gain business, and how effectively we communicate with others can enhance or destroy what we set out to do.

We will briefly explore some of these typographic arts later in our document, but we start by defining Desk Top Publishing as a way the mass of people can start to use some of these 'traditional' publishing skills.

Why use Desk Top Publishing?

Research by *Harvard University* released in the 1960's produced the following interesting information about use of typography versus typewriters:

Documents produced using typography were found to be:

- More effective in communicating
- Easier to read
- More authoritive
- Less paper used.

Add to this the ability to include pictures and diagrams and the information process becomes far more powerful and understandable.

Authority is an interesting attribute resulting from the use of Desk Top Publishing. Documents using 'Publishing technology' tend to be read as being authoritive more than typewritten. This in part is because typographic documents are (should be) easier on the eye than typewritten. The research showed that a better transfer of information took place, but together with a feeling that the typographic version must have some authority over that of the typewritten. The typewritten document is seen to be a 'draft' temporary situation. This may well change when everyone uses typography, but until then typewritten seems to be that interim step.

I have seen this "authority" effect the way documents have been viewed, in that in several publishing systems where I have played a role in implementing it has produced publishing (typeset) documents much earlier in the production cycle. In all of these cases, prior to the new system being used, the users had got used to typeset being the end process - the need at that point to make sure the information is right. At this stage a commitment to print imposed more need to get it right. Previous typewritten stages imposed less pressure - "well there's always the typeset proof to make our last comments etc". After the new systems installation, quality improved because developers now saw a "what you see is what you get" document on day one, and made, became far more interested in getting the document into good shape right at the beginning.

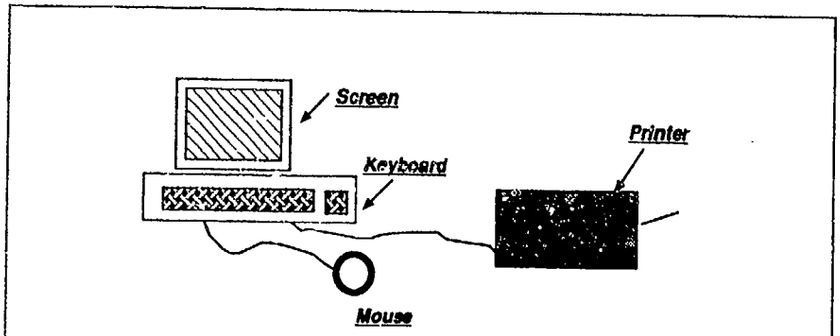
Another interesting point (and I hope to clarify this later) is that the human brain and eye can only absorb so much, and badly designed pages stop or hinder information transfer. The result being "poor" quality, or worse the wrong information.

As for costs, print (publishing quality) usually uses less paper for the same information, due to proportional (different) character widths, and due to presentation being much easier due to the range and availability of sizes, typefaces, founts* making emphasis much easier. Also using the best printing technology for the task in hand can affect the "unit" cost attached to one document, potentially saving vast sums of money on the overall process.

In business, the costs of *identified* publishing usually amount to 5-10% of the enterprises revenue*. If you add to this reports, word processing, the costs are enormous. This is where in my introduction, I stated that often the benefits were not always those anticipated comes into play. These costs hold true across all industries, most that would deny having a need to do "publishing" because they call the process other things like report generation or inter-departmental memos. All too often, evaluation of the publishing process has concentrated on the "production" cycle, disregarding other essential cycles such as document management, revision control, distribution.

Desk Top Publishing ...

Let's look at a DTP system, what is a minimum requirement.



Minimum Desk Top Publishing System requirement

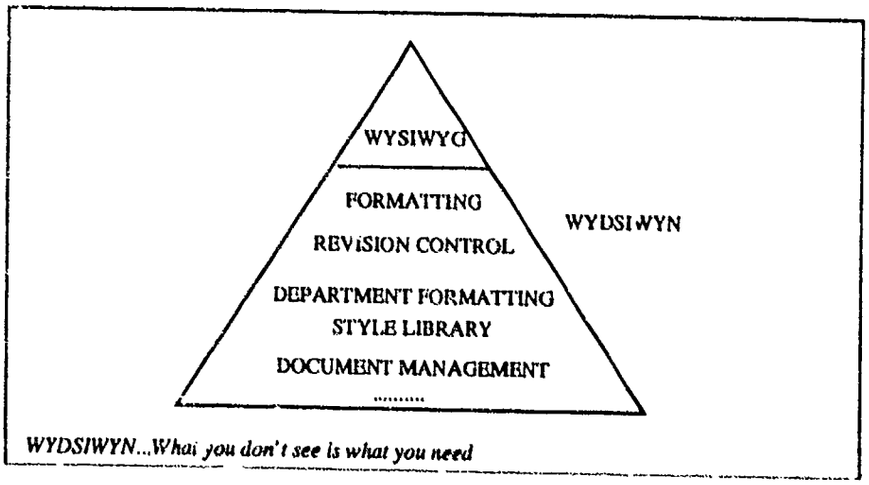
The system shown in the diagram above shows a minimum Desk Top Publishing requirement. We have a screen to show input or output, a printer to print the output, a keyboard, a mouse and some DTP software.

This system is for one user at a time, no network, no multi-user capability. The kind of system used at home. If the system requirement is for one person we could stop here and begin to talk in terms of what the software allows us to do, and what the printer allows us to print.

In real life few systems are like this. To be useful, even our system at home which holds files may well be useful or needed in a system at work which will go elsewhere. So straight away we are interested in whether our system at work is readable, compatible with the other system.

Other requirements start to emerge like how do we file, where, which version etc. So already we begin to see that to simply apply software to creating pages (WYSIWYG*) or otherwise is not enough. We need other things like .

- Document retrieval
- Document Management
- Revision Control
- Tracking Revisions
- Distribution lists
- Distribution

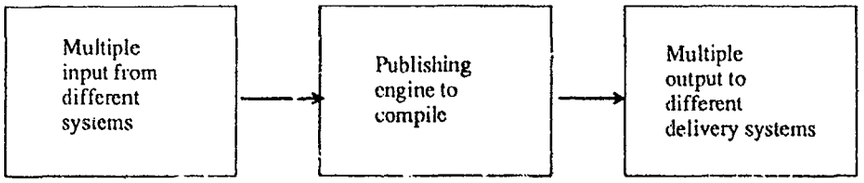


WYDSIWYN...What you don't see is what you need

Flexibility

The other important need we shall require is the ability to use more than just local printing for our output. We shall see in later chapter that delivery systems are growing and we need to use these if we are to succeed in business. As an example, your team colleagues may want to see the document on a screen *before* printing takes place.

What an ideal DTP system consists of can be simply described as the following diagram including an assumption that some form of management between the cycles is taking place:



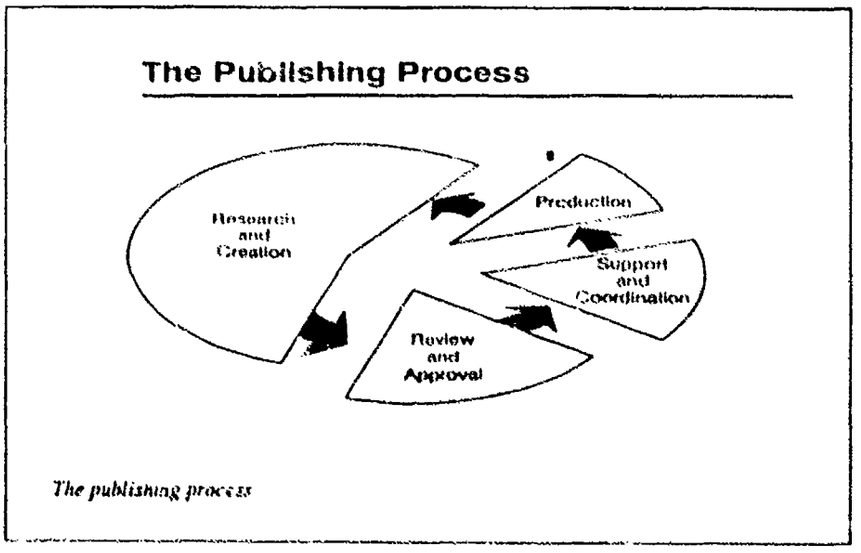
An essential requirement being that because we may change the output delivery one time we do not want to alter the document every time to do this.

The publishing process

An important point to make in describing any publishing system is to take a look at the actual production and publishing cycle. The events that have to happen to make DTP a success.

Research has shown that the actual production part of the cycle is only about 10% of the overall happenings. The real cycle looks similar to this :

If we simply concentrate on the production part of the cycle (very often the WYSIWYG) we will never achieve the results we have been seeking.



The publishing process

Let me use a real life situation to emphasise this important point.

A company wanted to replace the remote typesetting plant with a in-house typesetting Operation. The main reason given was that it took 13 weeks to get manuals typeset and control was lost to the remote operation.

When the actual events were analysed the cycle looked like this :

• Author prep	2 weeks
• Delivery of m/script to typesetters	3 days
• Production control procedures (booking job in)	4 days
• Typesetting	2 weeks
• Delivery of proofs to authors	3 days
• Proof checking	2 weeks
• Delivery of manuscript to typesetter	3 days
• Proof correction	1 week
• Platemaking	1 week
• Printing	1 week
• Binding	1 week
	13 weeks

What this shows is the typesetting process actually takes 3 weeks of the 13, so spending on the typesetting process can *ONLY* save 3 of 13 weeks if, and its a big if, we remove typesetting as a need altogether. What this tells us is that to make a big impact on reducing the 13 week cycle we needed to look at the TOTAL process, including the delivery!

The target in this real life situation was to reduce the overall process to around 48 hours for camera ready artwork, and another week for bulk printing and binding. (2 weeks maximum instead of 13). This was achieved!

In summary then, we need to view our desktop publishing in terms of the total processes needed, and then to realise the benefits by attacking the whole process.

System requirements

The previous chapter may have suggested that the needs of a system can be enormous, and so they can, but as in everything else there is a place to start. Let's start at the beginning, to produce pages we will need a way to create :

- Words (text)
- Pictures (image)

There are several ways that text can be put into a DTP system:

- Directly from the keyboard of the DTP system.
- Imported from word processing on the system.
- From other disks created elsewhere.
- From OCR readers/ICR readers.
- By communication lines from database etc

.The first method is the simplest to talk about, but generally is not the most widely used method. Most organisations have a variety of systems available, all creating word (text) and often with incompatible word processing systems. Conformity of DTP system is desirable but often inpractical. So the most widely used method is to use word processing packages for text creation, and then to input the created text into DTP systems.

In fact, this makes good sense. Text capture should be fast and flexible. Often DTP systems slow down the capture process due to documents being made up of 'pieces' of text, created at entirely different times.

So what are the useful characteristics of a text creator (word processor) within DTP systems.

- Easy creation of text
- Good filing system
- Spelling checkers
- Grammar checkers
- Easy tabular setting
- Compatibility with DTP system
- Character set capability

Other areas that may interest us are those that the enterprise may impose upon us. For example, corporations that have adopted SGML (Standard Generalised Mark Up). See later section on SGML)..

Another area that can be extremely difficult is that of tabular setting. The word processor is more usually uses characters of equal width, whereas DTP system uses character widths that are proportional to each other. Also each character has its own width which varies with typeface in use. Many hours have been spent trying to overcome this areas of incompatibility!

Text from other devices

Often text is held or has been created elsewhere. Even in the single user environment we want to obtain text held elsewhere for incorporation into our document.

Three main ways this can be achieved are :

1. Communication line input
2. Disk reader input
3. Direct connection to the "network"

Communication input

Most PCs, DTP systems can connect to external services or devices, usually by serial connection. The text coming in this way often has control coding for the external device or may have characters that are different on DTP systems.

We need a way of translating, converting these strings, so often we need the DTP system to provide these import converters. Also the communication line must be capable of transmitting the whole character set (e.g. 8 bit).

Network connection

Without doubt connection on the network is the desirable, but connection must not be mixed up with interchange of information. This interchange is an area I will cover in later chapters with SGML and Compound Document architectures.

Disk reader

Alternatively often the text we need is held magnetically on alien disks, magnetic tape. The 'black box' technique - the disk reader is widely used for this requirement.

The disk reader does two things. Firstly it allows us to read the disk (no. of tracks, no. of sides etc.). Secondly it reads the text and then passes it through translation tables and writes a new file to disk. This new file is then imported into the DTP system.

Disk readers typically cost from £2000 - £18000.

Optical character readers (OCR/ICR)

There is another way that text may be held. On paper ! Often items needed are only held on paper and no electronic version of that text is held. In this case we need to read the text and then to file it electronically or import it into our DTP system. OCR (Optical Character Readers) do just that. They read the characters by scanning for recognised patterns and then write to disk.

Because OCR readers scan and look for patterns the patterns need to be recognisable so with OCR it is typical for it to understand default typewriter characters (for example, Courier, Elite etc.).

ICR readers (Intelligent Character Readers) do the same as OCR readers, but they have some intelligence, simply put they can be taught patterns. First they attempt to understand the pattern and then ask for confirmation. Once the learning is done, off it goes and does the OCR bit.

OCR readers/ICR readers typically cost from £2000 - £50000.

Image

One of the big advantages DTP systems have given us is the ability to combine pictures with text. Image scanning is the de-facto standard way of electronically capturing an electronic image of pictures.

Two main *pictures*, images are used :

- Line art
- Photographs

Line art may typically be used in Company Logotypes.

In hardware terms the scanner is exactly the same as in OCR readers. A spot of light is scanned from left to right one line at a time across the paper. Black portions register while do not. That way a 'picture' is built up which in dots represents the original picture.

In technical terms the difference between image and graphics is that image is a bit-mapped image (dots) but graphics are described in mathematical equations (vectors).

Most scanner software or DTP software would enable users to do some form of editing or correction to image. Pixel editing, contrast variation, cropping (removing top, bottom or sides) are examples of these facilities.

Important standards for storage of image are TIFF (Tagged Information File Format).

Graphics

No DTP system called a DTP system would be sold today without some form of graphic creation facility. This is the ability to create :

- Boxes
- Oblongs
- Circles
- Rectangles
- Lines
- Polygon
- Text within blocks

Some of the essential requirements are :

- Change sizing (scale)
- Edit change thickness of ruler etc.
- Group or ungroup parts of graphic
- Add text and position
- Add shading, tinting

One thing almost essential is the use of a "mouse". Although it is possible to use cursor keys to create boxes etc., editing needs mouse and preferably windows to exploit the possibilities.

This is the world of WIMPS. Windows, Icons, Mouse and Pointers.

Graphics from other systems

So far we have spoken about graphics from within the DTP system. Nowadays though we need to incorporate graphics from other devices within the enterprise. The main need is:-

1. Graphics from graphic generators (e.g. CAD/CAM)
2. Business Graphics (from PC spreadsheets etc.)

The usual way these graphics can be brought into a DTP sysem are :

1. By plotter input (where the DTP system emulates a plotter
2. By file format import from GKS, IGES etc.
3. By interchange standards, architectures

Laser printing

There is no doubt that the improvement in Printer technology has been the main criteria in DTP system exploitation. Laser printer technology, has enabled users to get to near publishing quality at reasonable cost.

In a way, it is the printer that slows development of more functionality in DTP systems. For example, colour systems and higher resolution scanner technology.

Laser printing is the only technology coming anywhere near to photo typesetting quality (the latter being typically >1000 dots per inch). Dot matrix, Ink jet printing providing reasonable results, it is the Laser (Xerography) principle that has allowed the exploitation of DTP systems.

Later we describe how Page Description Languages enable us to drive such devices.

One area worth mention is that the connection of printers as peripherals can limit the usefulness of a DTP system. If as on some systems, the printer can only connect by a cable direct (not network capability) it can severely limit the ability to distribute printing capability around the enterprise. Speed is another important consideration. Printer today can be 8, 20, 40, 80 or 120 pages per minute. (example Xerox 9700)

Delivery systems

Right at the beginning of this document on DTP we said that there was more than just DTP to the publishing need. Delivery systems for published information grow every day. A favourite story used to explain the benefits of Electronic Publishing in terms of the importance and variety of the processes required is the documentation of an aircraft manufacturer, where the paper documentation is heavier than the aircraft itself.

These are a few examples of the way in which information once created may be published :

- VTX (Videotek Systems)
- CD-ROM (increasingly used for Encyclopaedia, Chemical Pharmaceutical requirements)
- Print on Demand
- Phototypesetter

Delivery systems can be viewed as belonging to *electronic* delivery systems or *paper* (hard copy) based systems.

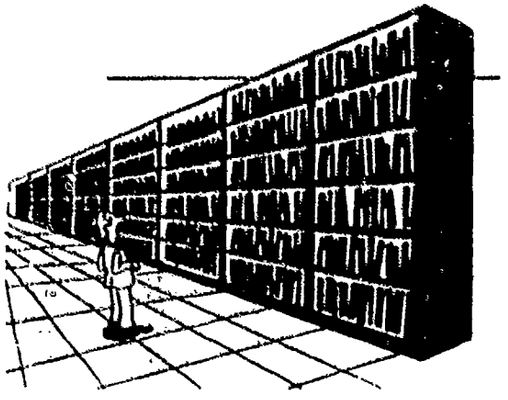
Document management and retrieval

So why is this document management an important requirement?

If I am a single user with 70+ documents to in my electronic in-tray, and some of these documents I want to include in other documents that will be created and sent elsewhere. Where is the one I want?, is this the latest version?

That's my problem, but I live in a group which as individuals each has another document which is a valuable resource others in the enterprise I work for want to use or refererence. Lastly, the enterprise has this resource, but who has what and where and at what stage?

Document Management therefore needs to make possible the use of the enterprises resources, make them available to others and reduce the need to keep re-keying and re-inventing the wheel everytime communication needs to take place. It also has to let the organisation know that the information I have included is the *latest* information available, up-to-date and hence a *quality* product.
It should also enable me to put together the 'pieces' of information I now wish to build into pages.



Documents and components are a resource to the organistion

Composition systems

In starting this chapter first an explanation as to why I chose the title "Composition" systems.

My old trade was as a Compositor. The Compositor's work was the whole cycle from typesetting, to page-make up, through to imposition for platemaking. So we can see that all that pre-ceded this chapter was the composition cycle; we have spoken about text creation, the gathering of image, the creation of graphics and the printing (proofing). Now for real live making up pages. Th exciting bit most users of DTP systems want to get to.

However, before we start, let's ask the question. What sort of page is it we wish to build.

I like to describe pages as belonging to one of two different types, and the choice of a DTP system can be made good or bad by choosing the DTP on the basis of the right or wrong requirement.

Two main types of page exist :

1. Dynamic - highly changing structure (example, Advertisements, Posters).
2. Structured pages (example, reports, books etc).

Now we know there are two types we can start to realise that to build each type of page needs a different process.

Dynamic pages need Page Make Up systems where the user dictates how each item heading, column is positioned sized.

Structured pages are "compiled" according to rules of the page or document. Chapter headings are this way, sub-headings are that way.

So I like to describe the composition (make-up) of pages as being:

- Dynamic (Page Make Up) or,
- Structured (Compiled - Paginated Systems)

Finally we can look at how each can be built. By using batch processes (Compilers) or by interactive real-time systems.

Batch versus Interactive composition

The choice is critical to success. If we choose interactive systems to make up hundreds of pages where the text (highly structured) has come from a database we will spend a long time executing what a batch system could do overnight in a few seconds per page.

Try and write rules about a dynamic page for a batch system and we could spend hours

writing the rules for one page.

One of the ways we can look at the two systems is to relate interactive page make-up as being like the painting of picture, where each brush stroke is defined by the artist. Whereas batch is more like the production of buttons, designed once, multiple style possible but when th style is chosen hundreds can be produced quickly.

Let's use some examples where the choice of batch or interactive systems should normally make the task in hand easier or more difficult. Take a timetable as an example. The entries are on database, each page looks the same, maybe a different style for the index. Once we have defined the "rules" for the two page types, the rules are good for hundreds. The result is that batch is probably best for this job.

To show an unusual, but good example of the benefits of batch by often describing a customer requirement undertaken by a colleague of mine who was asked to produce a specification for a company specialising in the printing and production of wedding stationery.

The customer had a variety of styles for wedding stationery on sale ranging from simple to silver bells. The selling was done at bookstalls and at railway stations and the whole process from receipt of order through to delivery of the completed job took too long. The company wanted to simplify and speed up the whole process. The batch composition system enabled the following process:

The bookstalls telephoned orders into the sales office where the administrator would key in stationery style, name of bride and bridegroom, location of reception, hymn numbers and prayers to be used.

The batch composition system could compose the wedding stationery by collecting the style information, hymns and prayers held on the database, putting the "pages" together by compilation of the pieces according to the "rules" and then passing to phototypesetting for instant printing.

The result of this interesting story is that the whole process delivered completed stationery within 48 hours with very little intervention.

One can equally find examples where to see and move pieces of a page as if by painting is essential to deliver the effect desired by the producer, an advertisement being a good example of this.

How does this relate to DTP systems ? DTP systems as part of design use these principles of batch or interactive. One product may be better at one than the other, and most systems now try to incorporate both capablities into packages, but according to the market being targetted are generally better at one or the other.

For example, Page Maker was a dynamic page make-up system and in its newest release V3.0 it has added a structured compiler capability. Ventura always was a structured handler. Interleaf Workstation has now added popwerful interactive page make-up through "micro-documents" its new Technical Publishing Software Version 4 where before its strength was typically applied to structured documents.

Enough for now of the different approaches systems make. Let's now look at the common functionality we need to successfully make pages. Range of Typefaces (Fonts)

Range of Sizes

Hyphenation and justification

Multi-column make-up

Headers, Footers

Widow, Orphan control

Editing

Search, Search & Replace

New page

Contents compilation

Tabular capability

Indexing

Wrap around text

Multi character set capability (accents etc)

Cut and paste (blocking)

Picture, graphic placement

File import and export

Printing

Copying

Deletion

WYSIWYG or

Previewer

Grid (For graphic creation)

At the end of the paper we look at a checklist of different systems in Europe to see how some of the functions, designs apply to proprietary solutions.

Publishing standards and architectures

Now that we have discussed various components of a DTP system we can begin to talk in terms of a framework (or architecture) within which our components fit.

First, let us revisit the various components :

Several factors emerge from our list of components

1. Connections to a common network
2. Interchange from one application to another.
3. a need to manage the various components
4. a need to manage parts of the publishing process

The first, the network is important in several respects. It allows us to connect printers anywhere we need them, and replaces the problem we described in Chapter page .

Secondly the network allows our system to grow and to "talk" to the outside world.

The next vitally important factor is the area of interchange.

Some other areas that are less obvious initially are those of consitent user interface to all users within our system.

In this Chapter we will briefly describe some important standards in the area of interchange relevant to electronic publishing and then some work under the CALS initiative which includes hardware requirements.

Standard Generalised Markup Language (SGML)

SGML is an international stardard that describes the language of markup of text. Increasingly it is seen as an effective technique on today's different organisations throughout the world. In Europe its adoption by many companies or organisations may impose its use on the providers of information.

Background to the standard

The late 1970's saw the widespread introduction of dedicated word processors, followed by the advent of word processing applications on home and business microcomputers.

Inevitably such products were to be used by authors and others to produce text in the form of reports, documents etc and it became obvious very quickly that once created on one product, parts of documents or entire documents were to be processed by others who had incompatible systems. This incompatibility produced wasteful, costly and unmanageable situations where often the result was that it was often quicker and cheaper to rekey the information again rather than to attempt the interchange of electronic data.

Various techniques were introduced to remedy this situation, particularly in the Printing and Publishing industries, for example diskette readers and translators, where generally the attempt was to use one manufacturers format code to produce a similar response on anothers but in many cases this translation was only partially successful.

Formatter incompatibilities

Principal amongst these difficulties is the problem of handling the format or control characters which are embedded within the text stream by the word processing software. The codes are inserted to control screen and printers characteristics, but each manufacturer or word processing product has a unique set of these codes dependant on functionality and they very often hinder or are incompatible within other systems.

In addition, there is often a mismatch between functions on one product versus another, or in other words, you run out of codes. This was found to be particularly true on word processor text being used on phototypesetters in that the latter is inhereantly far richer in functionality than word processing in general.

The effect of these irregularities was that the text stread became "device specific" to a particular product or printer and made the task of running other applications virtually impossible or difficult.

Procedural markup schemes

Some organisations saw that a way over this dilemma was to insert within the text stream, markup codes specific to the oytput device rather than the word processor application. This often required the word processor user to insert codes within the text that were alien to them or in some cases meaningless to both the operator and the wordprocessing software. This type of markup is often called procedural or layout markup.

In these types of scheme the markup codes indicate formatting required at the printer, phototypesetter etc. For example a coding stream such as:

ft1, sz10, l138

may indicate that a typesetter is required to use a typeface such as Times Roman in a size 10 points to a line length of 38 picas.

It can be seen that these codes are device dependant, if the printer has no Times Roman capability the codes becomes redundant or more may stop the process running altogether.

This form of coding also has the following disadvantages:

1. Authors need to learn alien languages and the output device characteristics to use them.
2. The style of the document is being defined within the document itself and any change of style could necessitate the editing of the entire document.
3. The embedded codes can interfere with the document being processed on other applications
4. Whenever an output device is replaced it may require a complete retraining of authors

Descriptive, logical or generic markup schemes

Descriptive markup schemes approach the subject another way, by looking at the document components themselves rather than by layout characteristics.

Authors, creators of text are not principally concerned with the processes of printing or typesetting and think more naturally in terms of content and structure.

They know that they are writing chapters, paragraphs, headings, lists, tables and within these the need to highlight or emphasise cross references or other items within them.

It is therefore much more natural for them to identify or describe the logical components.

Descriptive, logical or generic markup schemes exploit these natural characteristics. A generic code for a heading may appear as follows:

<heading>

The lesser than and greater than symbols simply defines the embedded string as a code instead as text.

This form of markup is seen to have several advantages over the procedural markup schemes described earlier.

1. The coding scheme is much more natural in terms of what the author is doing and therefore requires very little training

2. The style is not part of the code, this is defined elsewhere and can be applied differently according to the output device in use at the time.
3. The codes themselves are simple text streams that can be entered on the simplest text editors to the most complex.
4. The number of available codes is limited only by the user.
5. Potentially they are at least as powerful as procedural codes.

With this form of markup it became apparent that once devices were removed from the text stream, if a standard approach to generic coding was adopted the text could be universally acceptable to other systems and even countries.

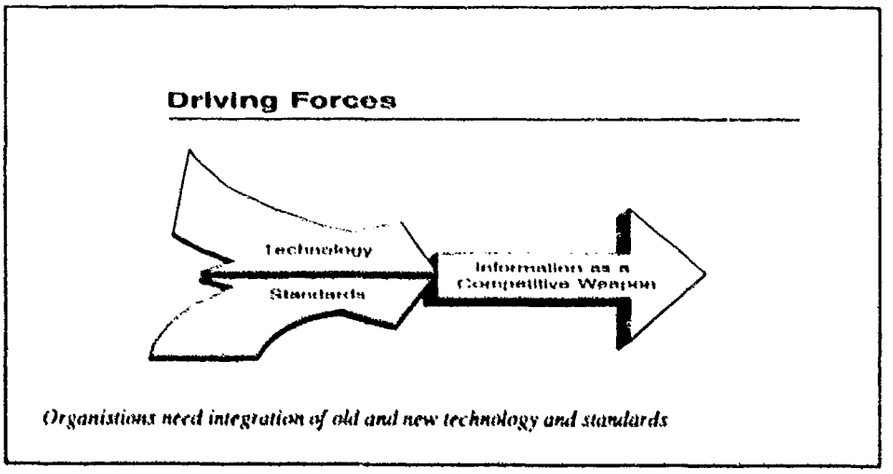
Standard Generalised Markup Language, SGML is such a standard and has been adopted by the International Standards Community and by many organisations worldwide..

Compound architectures (CDA™, ODA)

SGML primarily dealt with the interchange of text based systems, you can "call-in" graphics or images held elswhere, but are not seen to be part of a compound whole. Also, SGML as we discussed did not include information relating to the layout (or presentation).

Nowadays, business is presented with 2 problems:

Old character based technology needs to integrate with new image capable technology and standards appropriate in industry areas (for example GKS in the graphics world) need to be included in documents that contain other industry standards (for example inclusion of video picture with text and GKS).



Organistions need integration of old and new technology and standards

So in a way, what we now need is a "standard" that integrates standards that allows us to interchange, revise, mail, distribute and all those other things we need to do in order to deliver documents.

Work in this area is now the main theme of the 90s and standards such as ODA (Office Document Architecture) and in my own company with CDA™(Compound Document Architecture) are already addressing the needs expressed in this area.

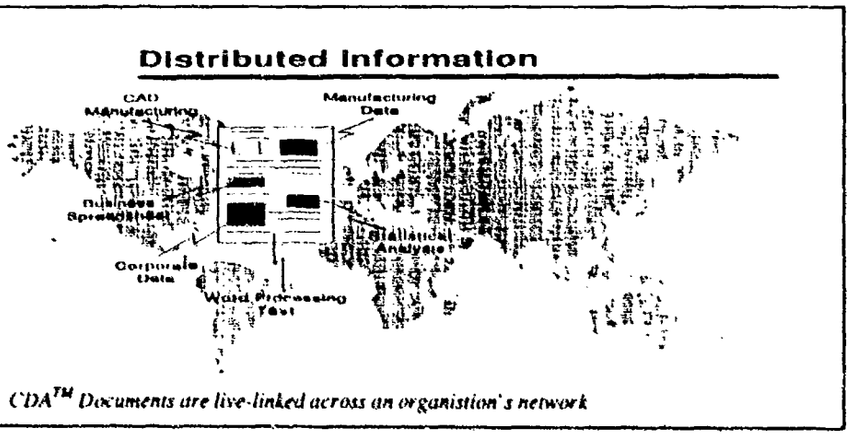
Having declared a some personal interest in declaring that CDA is the "best thing since sliced bread" let me now say why I believe that it is so important to a paper on desktop publishing.

We started right at the beginning of this tour of DTP stating that even on our home based system we would want to interchange information on different systems between documents. For 25 years or so I have been involved with "publishing" either at the production plants or at the authoring units, this interchange has been the major reason why users of publishing technology could not fully realise the

benefits that should accrue or was an area where most work had been applied to make interchange possible. It was for this reason that I got involved at a very early stage with SGML. But now we need to interchange, edit and do all the things we need to do with pages that contain pictures, graphics, voice, video; all these pieces coming potentially from any system ranging from mainframes to pc's. And not only coming from, but being the most up-to-date piece available at the time.

I want here to mention therefore, what I believe to be an important direction that DTP will take in the 1990s and can be seen now in products such as Digital Equipment Company product called DECwrite. That is that now compound architecture now make it possible to really interchange information across technology and with applications.

How does this work; CDA does allow a way in which "standards" can be interchanged with a standard and allows by "live-linking" to applications the latest information to pass into a document. These applications can be anywhere on the organisations network, so the document contains the latest information within the page currently available and anywhere the resource data is located.



CDA™ Documents are live-linked across an organistion's network

CALS

At this point, as with SGML, other speakers will be addressing this issue so I do not intend this to be the authoritive view of CALS, but people investing in or reviewing DTP need to understand how these standards affect the choice of a supplier.

What does CALS stand for ?

CALS stands for Computer-aided Acquisition and Logistic Support.

What is CALS ?

CALS is a project instigated by the United States Department of Defense (DoD), to accelerate the acceptance and use of product data in digital format.

Overview

In September 1985 William H Taft IV, Deputy Secretary of Defense, made the following statement:

"It is my goal that the Department of Defense (DoD) will establish plans to acquire, process, and use logistic information in digital form. In-so-far as possible, this shall be accomplished for new weapon systems entering production in 1990 and beyond... I have approved a strategy for the transitioning from our current paper-intensive weapon systems support processes to a largely automated and integrated mode of operation, with substantial progress by the end of this decade."

The above statement was followed on 24 September 1985 by a memo from Taft. This memo introduced the CALS initiative, and stated the objectives:

- The integration of Repair and Maintenance design tools into contractors CAD/CAE systems.
- To encourage the automation of contactors processes for the generation of Logistic Technical Information.
- To rapidly increase the DoD's ability to receive, distribute and use technical information in digital format. By 1990, all new major weapon systems will acquire technical information in digital form.

During 1988 in another memo from the Deputy Secretary of Defense,
the implementation policy for CALS was introduced. This memo stated that for all new weapon systems starting development after Sept 1988, the DoD should obtain proposals for:

- The integration of the contractor's data systems into the DoD's own system.
- The DoD to have access to contractor's data-bases.
- All contracted product information deliverables to be in digital form.

In addition to all new weapon systems, the Deputy Secretary of Defense instructed that all existing contracts should be assessed to see if any significant benefits would be gained from a retrospective use of the CALS initiative. Taft stated that "Each application decision shall be made on its own merits with respect to the productivity and quality improvements expected".

The DoD recognise that the CALS initiative must take the following points into consideration during its introduction:

- That integration is not an all-or-nothing proposition, and that the DoD should see initially how far contractors can go towards these standards.
- On-line access to a contractor's data-base would be limited, so as not to compromise the contractor's competitive edge. The principal area targeted is information for review and approval.
- Delivery of digital information will be paced by the availability of both validated standards for delivery, and the ability of the DoD to accept this data.

It wasdecided that CALS will have a phased introduction,
introdction will be achieved in two parts.

Benefits of CALS

- The Department of Defense have projected that the CALS initiative will offer the following benefits: In the acceptance of digital format information, the DoD project that there will be a 20 - 30% saving in technical manual authoring.
- In addition, there will be a 35% improvement in troubleshooting accuracy.
- From the on-line access to contractors databases, the DoD have again projected a 20 to 35% saving in Integrated Logistics Support (ILS).
- To reduce acquisition and support costs on all new weapon systems, by removing the effort involved in typesetting, printing and shipping vast quantities of hard-copy information around the world.
- To improve the repair and maintenance of weapons, systems, through direct access to contractors databases.

Page Description Languages (PDL)

In my introduction I stated that laser printer technology had require applications that could exploit the technology. Simply put laser printing allowed users to "draw" on paper and not be restricted to the 1 or 2 fonts that typewriters had allowed us. The laser printer is basically a scanner in reverse in that charges of electricity by the Xerographic printing process either put a dot of carbon ON or NOT on the paper.

As with lithographic printing the dot or absence of dot draws a picture.

The *resolution* of the printer usually being referred to as so many of these dots to the inch. Typically 300

in todays range of printers.As with everything else, printers began to flood the market each requiring a way of being "driven" and it was essential and desirable that a "standard" way of driving these devices evolved and became used.

These "standards*" became known as page description languages", sometimes abbreviated to PDLs. Basically, PDLs being a high level language way of describing to the printer scanning engine (the RIP, raster image processor) where to put a dot and where to go next. Two PDLs became prominent in the early days withI have to say a clear winner enmerging:

Adobe Postscript
Xerox Interpress

Postscript won, in a way a shame in that Interpress did lots of other things like turning pages over for double sided printing, including stapling etc. Postscript however soon caught on and is now widely used and a very powerful capability.

What Postscript now enable users to do is to choose any postscript printer based on manuafacturer, speed etc knowing that it will work with the DTP application.

Note These Are De-Facto Standards

Using DeskTop Publishing

I finally move into a discussion area,albeit briefly into an area so often left out of the discussion on DTP which is to do with the skills needed by the user him or herself, and to encourage some understanding of the art of typography itself.

It always amazes me that we would seldom allow anyone to start designing houses on a CAD/CAM system for real, without some basic knowledge of building materials, regulations, yet we often expect anyone to undertake the art of typographic of graphic design simply because we have just purchased the latest copy of DTP software.

One of the things DTP has given us is much greater scope to use different typefaces, sizes to emphasise those areas critical to the information transfer. Used wrongly the results can be awefull

So given the usual excuse of time to explore within this presentation to cover this vast subject lets get over an awareness of things worth knowing.

First, readabilility; the eye has an optimum "line-length" over which or under which reading for any duration of time becomes tiring. Research shows that for a 'normal' typesize of 10-11 points some 27-31 picas in length is about right. Now without wishing to get too technical over this understand that the last time you picked up abook and kept jumping to the next line without finishing the other it probably was not your fault. Its simply the brain and eye not being able to focus on what is a badly designed page width.

What else? The page margins, if badly designed can detract the eye from the page. Serif and sans serif typefaces do respond to fashion, but also for lengthy documents serif, which is nearer the manuscripts designed by monks years ago are generally easier to read. Nowadays blocks of tightly spaced sans serif (Helvetica this) are put in front of undeserving recipients expecting them to enjoy every minute of reading such a document.

The message here is that Timetables need different treatments from books. One is referred to sometimes sparingly, others are to be read for long periods over short durations, so our design must reflect these requirements. A log-cabin is not the same as a brick mansion!

Paper has a bearing on readabiltiy also, glossy white paper may be fine for a brochure requiring instant impact, but to read a book one would sometimes need to wear sun glasses.

People using DTP don't need to be experts, but they do have to understand what is good design and what is not and should interest themselves in learning a little about the subject.

Page design itself is not the whole story, especially in the structured world an understanding of the document structure is necessary in order to understanding what level this heading should be, and consequently how the automatic functions provided by the DTP application can be employed.

In SGML systems this is vitally important in that design of SGML systems for organisations requires that the complete document set of the enterprise are analysed for structure and as a consequence the elements (building bricks) contained and required. The better the design is managed the easier the task for the author or typist.

*****

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Publishing solutions

Publishing Solutions on VAX in Europe.

NAME COMPANY	SHORT DESCRIPTION	BEST USED FOR	ADVANTAGES	PLATFORM	USER INTERFACE	DOCU. LENGTH	ORIENTATION PAGE	ORIENTATION STRUCTURE	EXTENSIVE TEXT	EXTENSIVE GRAPHS	PRICE £$	PRIMARY APPLICATIONS
PageMaker Aldus	Page Layout Document from DTP	Short Page Layout Documents	Very Good DTP for Page Layout	MS-DOS (VAX as Boot Member)	WYSIWYG	1 ÷ 20 PAGES	+	-	-	V	> 0.8	Newsletters, Presentations, Short Bulletins
ALIS APPLIX	Extra Pro Office System For Use With Spreadsheet & Math Equations	General Office Publishing incl. Statistics	On DEC ULTRIX	VAX ULTRIX	WYSIWYG	1 - 20	+	-	V	V	xxx	Short Office Documents Incl. Stats. Spreadsheet
DECwrite DEC	Compound Document Editor for VAXstations	Documents for Office Use	First Native CDA Product, Live Links	VMS ULTRIX	WYSIWYG	1 - 200	-	V	+	V	> 1.2	Documents with Automatic Update of Charts, Graphics, etc.
DECpage 3.0 DEC	General Office Documentation	Medium Office Documentation	Excellent functionality in 3.0 support for A3 format	VAX - VMS only	Batch	10 ÷ 50	-	V	V	-	xxx	Office Docu. With High Quality Output
VAX Document DEC	Product Development Documentation With High Quality Output	Complex Tech Documents, Best For Case & OEM's	Only on DEC-HW many postscript fonts	VAX - VMS only	Batch	> 100	-	V	+	-	xxx	Software Docu. A La VMS Documentation Mil 2167
Scribe UNILOGIC	Product Development Documentation Similar To VAX Document	Complex Techn Docu. With Archive & Retrieval Syst	Support wide range of printers good math equations	VAX - VMS also Apollo, Sun, IBM	Batch	> 100	-	V	+	-	> 20	Software Documentation Long Docs.
Graphotext Jacquard France	Low End Publishing System	Tech. Doc. With Separate Text & Graphic Editor	Tech. Doc. Where Pages Are Structure Oriented	VAX VMS	WYSIWYG	1 ÷ 20	-	V	V	V	xxx	Technical, Short Documents, As Repair, Maintenance Documents
Glyph ART-DEAL France	Short Documents Layout, Storage & Archiving System	One/Two Pages of Maintenance Reports, Repair Cards	WYSIWYG On VT 240/340 Terminals	VAX VMS	WYSIWYG	1 ÷ 5	-	+	-	-	xxx	Short Job Cards, Maintenance/ Contract Letters With High Rev. Rate
Full TPS 4.0 Interleaf incl. Core TPS	Dedicated Workstation Publishing System	Long/Complex Structured Documents	CAD-Graphics Import & Export	VAX - VMS	WYSIWYG	10 ÷ 500	-	+	V	+	> 10	Techn. Document Flyers Repair Books
PAGER, CEPR DATALOGICS	Commercial Books And C ocuments	Long/Complex Books & Techn. Documents	Well recognized SW for commercial documentation	VAX - VMS	Batch	> 100	-	+	+	-	xxx	Books, Tech. Documentation Legal, Insurance, Financial Reports
CENTRUM POLYGEN	Excellent Documentation System For Chemistry	Scientific Documents With Molecular Modelling 2/3D	Full chemistry & Lab's oriented	VAX - VMS ULTRIX	WYSIWYG	1 ÷ 30	-	V	-	+	xxx	Scientific Reports incl. Chem. Formulae

+ = Very Good; V = Yes; - = No.

GLOSSARY OF TYPESETTING TERMS

A

ANNOTATION (I) A type label added to an illustration. (II) Explanatory notes printed in the margin of a text.

ARTWORK Matter other than text prepared for reproduction such as photographs, diagram, illustration.

ASCENDER The section of a lower case letter rising above the x-height, eg the upper part of b or h.

AUTO INDENT Instruction entered in a machine for typesetting to indicate that text should be automatically indented until the command is cancelled.

B

BALANCE In layout or design, an arrangement that is visually pleasing, eg an equal relationship between text and illustrations on facing pages.

BASE LINE An imaginary line on which the bases of capitals rest.

BLIND FOLIO Page number counted for reference or identification but not printed on the page itself.

BLURB The description of a book or author printed on the jacket or on promotional material.

BODY The main portion of a book (excluding appendices).

BODY COPY/MATTER/TYPE Printed matter forming the main part of a work, but not including headings etc.

BODY SIZE Point measurement of a body of type.

BOLD, BOLD FACE Type with a conspicuously heavy, black appearance. Based on the same design as medium weight type in the same fount.

BOOK Any work consisting of leaves bound permanently together.

BOX, BOX RULE An item of type or other graphic matter ruled off on all four sides with a heavy rule or border.

BOX FEATURE/STORY Information in a book presented separately from the running text and illustrations and marked off with a box rule.

BULLET A large dot used to precede listed items or to add emphasis to particular parts of a text.

BY-LINE The name of the author that appears above an article.

C

CAMERA READY A term applied to artwork, copy or paste up that is ready for reproduction.

CAPITAL, CAP The term for upper case letters, deriving from the style of inscription at the head, or capital, of a Roman column.

CAPS AND SMALLS Type consisting of capitals for initials and small caps in place of lower case letters.

CAPTION Strictly speaking, the descriptive matter, printed as a headline above an illustration, but also generally used to refer to information printed underneath or beside a picture.

CASTING-OFF Making a calculation as to how much space manuscript copy will take up when printed in a given typeface.

CENTRED Type which is placed in the centre of a sheet or type measure.

CENTRED DOT A raised dot used as a decimal point between figures.

CHAPTER DROP The level at which text begins underneath a chapter heading.

CHART A graphic demonstration of information on values and qualities.

CICERO A European unit for measuring the width, or measure, of a line of type and the depth of the page. One Cicero = 4.511mm or 12 Didot Points. See also Pica.

COCK UP FIGURE/LETTER see Superior figure/letter.

COCKED UP INITIAL A bold face capital that projects above the line of the type.

COLD COMPOSITION/TYPE Typewriting or typesetting in which no molten metal is used.

COLUMN (I) A section of a page divided vertically, containing text or other matter. It is measured by the horizontal width. (II) A vertical section in tabulated work.

COLUMN INCH/CENTIMETRE A measure of space used to calculate the cost of display advertising in a newspaper or periodical. The measure is one column width by one inch (or one centimetre) depth.

COLUMN RULE The light faced rule used to separate columns in newspaper.

COMPOSE To set copy in type.

COMPOSING ROOM The area of a printing works specifically designated for typesetting and make up.

COMPOSITION Type which has been sent in a form ready for reproduction by Letterpress printing or Photolithography.

GLOSSARY OF TYPESETTING TERMS

COMPOSITION SIZE A description of any type up to a size of 14 points, used mainly in setting text.

COMPOSITOR The person responsible for setting type, whether by hand or machine process.

CONDENSED A typeface with an elongated, narrow appearance.

CONTENTS A page of a book listing the articles or chapters in it.

CONTINUOUS TONE Photographs or coloured originals in which the subject contains continuous shades between the lightest and the darkest tones, without being broken up by dots.

COPY Matter to be set in type.

COPYFITTING See Casting Off.

CORPORATE IDENTITY/HOUSE-STYLE The elements of design by which a company or other institution establishes a consistent and recognizable identity through communication, promotion and distribution material.

cpi abb Characters per line. The measure used by editors and typesetters in preparing and printing copy.

CREDIT/COURTESY LINE line of text accompanying an illustration giving the name of an organization or individual supplying the picture or Artwork.

CROP, CROPMARK The part of a photograph or illustration that is discarded after it has been trimmed.

D

DASH A punctuation mark (-) usually known as an EM rule.

DEAD MATTER Leftover matter that is not used.

DELINEATE To accentuate outlines in line artwork by making them heavier.

DESCENDER The part of a lower case letter that falls below the x-height.

DIDOT POINT The continental unit for type. It measures 0.0148in whereas an English point is 0.013837 in. (7% difference).

DINGBAT A general term for ornaments.

DOT The smallest basic element of a halftone.

DROP CAP A large initial at the beginning of a text that drops into the lines of type below.

E

ELLIPSIS A sequence of three dots (...) indicating that part of a phrase or sentence has been left out.

EM A unit of linear measurement, 12 points or 4.5mm.

EM QUAD A space in type that is the square of the type size.

EM RULE/DASH A dash used in punctuating text, the length of one EM.

EN A measurement half the width of an EM.

EN RULE/DASH A dash (-) approximately half an EM.

END OF LINE DECISIONS Decisions made by a Compositor as to justification of type and word breaks at the end of a line. In computer typesetting this function may be included in the computer program.

EVEN PAGES Lefthand pages i.e. those with even numbers.

EXOTIC A traditional term for a typeface with characters of a language not based on latin letterforms.

EXPANDED/EXTENDED TYPE Type with a flattened rectangular appearance.

F

FACE The printing suface of any type character. It also refers to the group or family to which any particular type decision belongs, as in typeface.

FAMILY A group of printing types in series with common characteristics in design but of different weights such as italic, bold, condensed, expanded etc.

FAT MATTER Term for copy with a large proportion of spacing allowing rapid setting. Dense copy is known as lean matter.

FEATHERING The method of biting areas of a plate using drops of acid, controlling their movement with a feather.

FIGURES An alternative name for numbers. Arabic numerals are used more frequently than Roman ones.

FINAL DRAFT Copy fully prepared for typesetting.

GLOSSARY OF TYPESETTING TERMS

FINE RULE A line of hairline thickness.

FINAL LETTER A character in certain typefaces devised as the end letter in a word or line, not used elsewhere.

FIXED WORD SPACING A method of typesetting employing a standard size for spaces between words, leaving lines unjustified.

FLUSH LEFT, RIGHT Copy aligned at left or right margins.

FLUSH PARAGRAPHS Paragraphs in which the first word is not idented but set flush with the vertical line of the text.

FOLIO (I) the book sized formed when a sheet is folded making the pages half the size of the sheet. (II) A leaf of paper numbered only on the front. (III) A page number and running headline of a page.

FONT A corruption of Fount.

FOOT MARGIN The margin at the bottom of the page in a publication.

FOOTNOTES Short explanatory notes, printed at the foot of the page or at the end of a book.

FORMAT The general apearance or style of a book.

FORMATTING To program standard commands for a computer used in photocomposition corresponding to directions in the type markup.

FOUNT A complete supply of a Typeface.

FULL POINT A full stop.

FULL SHADOW A heavy outline to a letter or line of type.

FULL WORD WRAP In photocomposition, the transfer of a full word to the following line to avoid a word break.

G

G/M²/GSM, GRAMS PER SUQARE METER A unit of measurement for a paper used in printing.

GALLEY Long, shallow, metal tray used by compositors to hold type after it has been set.

GALLEY PROOF Proofs taken from the galley before copy is divided into pages.

GRAPHIC (I) A typeface orginating from drawn rather than scripted letter forms. **(II) A** general term meaning related to written or drawn symbols.

GRAPHIC DESIGN Design based on or involving two dimensional processes e.g. illustration, typography, photography and printing methods.

GUTTER Commonly, the channel down the centre of a page is incorrectly described as the gutter.

GUTTER BLEED An image allowed to extend unbroken across the central margins of a double spread.

H

H & J, H/J Hyphenation and justification. See also end of line decisions.

HAIRLINE RULE the thinnest rule that it is possible to print.

HAIRLINES The very fine strokes of a typeface.

HAIRSPACE Mainly used for letter spacing, the very narrow space between type.

HANGING INDENT A setting where the first line of each paragraph is set full out to the column measure and the remaining lines indented 1 em.

HANGING PUNCTUATION Punctuation marks allowed to fall outside the measure of a piece of text.

HEADING The title introducing a chapter or subdivision of printed matter. It is set in a style or size of type that distinguishes between heading and text, and between main and subsidiary headings.

HEAVY An alternative term for bold.

HEIGHT The vertical dimension of an image.

HIEROGLYPH An element of language recorded in the form of a Pictogram or symbol rather than as a written word.

HORIZONTAL DIMENSION The width of an image sometimes controlling reduction or enlargement in printing.

GLOSSARY OF TYPESETTING TERMS

HOT METAL General term for composing machines casting single pieces of type from molten metal.

HOUSE STYLE (I) The style of spelling punctuation and spacing used in a printing or publishing house to ensure consistent treatment of copy during typesetting (II) Corporate identity.

HYPHENATION The use of a hyphen (-) to divide one word between syllables or to create a compound form from two or more words.

I

ILLUSTRATION (I) A drawing, painting, diagram or photograph reproduced in a publication to explain or supplement the text. (II) A term used to distinguish a drawn image from one that is photographed.

IMPOSE/IMPOSITION To arrange pages of type in a forme so that when the sheet is folded the text will read continuously.

IN HOUSE A process or service carried out within a company, not bought in from an individual or organization.

INDENTATION Any setting short of the column measure.

INDEX The section of a publication giving alphabetical listing of subjects, proper names etc mentioned in the book, with page references.

INFERIOR FIGURE/LETTER A small figure or letter printed at the foot of ordinary letters and cast partly below the base line, for example in chemical formulae, such as H_2O.

INITIAL A large capital often found at the beginning of a chapter. It is usually dropped to a depth of two or three lines below the first line.

INITIAL CAPS Instruction to the printer to set the first letter of a word or phrase as a capital.

INTERLINEAR SPACING The method of establishing space betwen lines of type in photocomposition.

ITALIC Type with sloping letters. Indicated in a manuscript by a single underline.

J

JOBBING WORK Small every day printing such as display cards, letter headings etc, as distinct from bookwork.

JUSTIFICATION Spacing of words and letters so that each line of text finishes at the same point.

K

KERN, KERNING The part of a letter which overhangs the next.

KEYBOARDING A term referring to the first procedure in photocomposition, that of typing in copy to be recorded in the machine for setting.

L

LANDSCAPE/HORIZONTAL FORMAT An image in which the width is noticeably greater than the height.

LATIN A term for typefaces derived from letter forms common to western European countries, especially those with heavy, wedge-shaped serifs.

LAYOUT An outline or sketch which gives the general appearance of the printed page, indicating the relationship between text and illustration.

LEADER A group of dots usually three (...).

LEGEND The descriptive matter printed below a illustration, more often called caption.

LETTERSPACING The insertion of space between the letters of a word to improve the appearance of a line of type.

LIGATURE Tied letters in type.

LIGHT FACE The opposite of Bold Face.

LINOTYPE The first keyboard-operated composing machine to employ the principle of the circulating matrix and cast type in solid lines or slugs. It was invented by the German/American engineer Ottmar Mergenthaler and first used in 1886.

LITERAL A term referring to an error in typewritten or typeset copy (US *typo*).

LOGO abb Logotype

LOGOTYPE A word or several letters cast as one unit.

LONG PAGE A page with type extended by one or two lines to avoid an inconvenient break.

LOWER CASE The small letters in a Fount of type.

M

MAKE-UP (I) The sheet indicating the placing of the various items on a page. (II) The actual assembling of the page.

GLOSSARY OF TYPESETTING TERMS

MARGINS The blank areas on a printed page which surround the matter.

MARK UP To mark up is to specify every detail needed for the compositor to set the copy. The mark up is copy with instructions written on it.

MATTER Either manuscript or copy to be printed, or type that is composed.

MONOCHROME An image made up of varying tones but in only one colour.

MONOTYPE The tradename for composing machines which cast single types.

N

NON-LINING FIGURES/NUMERALS A set of numerals designed with descenders, therefore not of standard height and alignment as are lining figures.

O

ORNAMENT Decorative elements used with type matter such as flowers, borders etc.

ORPHAN A single word that stands at the top of a page when copy has been set.

OUTLINE LETTERS Typefaces in which the letters are formed of outlines rather than solid strokes.

P

PAGINATION The term given to number the pages of a book.

PI CHARACTERS see special sorts

PICA The old name for 12 points, the unit of measurement used in setting.

POINT Standard unit of type size. In the British American system it is 0.01383in, or 72 to the inch. The Continental (DIDOT) point is calculated differently.

p,pp abb page, pages.

Q

QUADDING Filling out a line of type by extending spaces with en or em quads.

R

RAGGED LEFT/RIGHT Typeset copy in which the lines of type are not aligned at left/right. See unjustified.

RECTO The righthand side of a book.

REVERSE OUT Set white type on black background.

RIVERS The streaks of white spacing produced when spaces in consecutive lines of type coincide.

ROMAN Ordinary vertical type as distinct from italic.

ROMAN NUMERALS A system of numerical notation based on symbols I (one), V (five), X (10), L (50), C (100), D (500) and M (1000), used in combinations to represent any figure.

RUNAROUND Text set to fit around an illustration smaller than a page or column width.

RUNNING HEAD The line of type which repeats a chapter heading etc at the top of a page.

RUNNING TEXT A body of text which runs over from one page to another even when there are breaks for illustrations and diagrams.

S

SANS SERIF A typeface without serifs and usually without stroke contrast.

SCRIPT A tyeface designed to imitate handwriting.

SERIF The small terminal stroke at the end of the main stroke of a letter.

SET (I) The width of a type body. (II) It is used as an instruction as in "set to 12 picas" or as a description, i.e. " handset".

SHADED LETTER (I) Letter forms such as outline letters, given a three-dimensional appearance by heavy shadows beside the main strokes. (II) Letterforms filled with hatched lines rather than solid tone.

SHEET A single piece of paper.

SHORT PAGE A page with text shorter than usual length, adjusted to improve the layout or accomodate a break.

SLOPED ROMAN A typeface commonly termed italic but actually a sloping version of Roman type.

SORT One individual piece of type.

SPACEBAND In mechanical methods of typesetting, a wedge shaped piece used to vary the space between words.

GLOSSARY OF TYPESETTING TERMS

SPECIAL SORT Type characters not normally included in a fount i.e fractions, musical symbols etc.

SUBHEAD The heading for the division of a chapter.

SUBSCRIPT see inferior figure/letter.

SUPERIOR FIGURE/LETTER Small figures or letters set above normal characters as in 12^{3}

SUPERSCRIPT See Superior Figure/ *Letter.*

T

TABBING (I) A colloquial term for tabulating. (II) The procedure of making a tab index.

TABULAR WORK Type matter set in columns.

TABULATE, TABULATING To arrange copy such as text or figures in the form of a columnar table, according to fixed measures.

TEXT TYPE/MATTER Any typeface of a suitable size for printing text usually up to 14 point.

THIN A word space measuring one fifth of an em.

TINT The effect achieved by breaking up colour into a percentage using dots which allow white paper to show through.

TYPE, TYPEFACE The raised image of a character cast on a rectangular piece of metal used in letterpress printing.

TYPE AREA The area of a page designed to contain text matter and illustrations forming the body of the work.

TYPE FAMILY A term covering all the variations and sizes of a basic typeface design. See bold face, condensed, expanded, light face.

TYPESETTING Methods of assembling type for printing, by hand, machine or photgraphic techniques.

TYPO abb Typographic error. A term referring to an error in typewritten or typeset copy See also literal.

TYPOGRAPHY The art, general design and appearance of printed matter using type.

U

UNJUSTIFIED Lines of type which are centred or which align only at one margin and are not adjusted in spacing to fill out the full measure of the line.

UPPER CASE The capital letters in a fount of typeface.

V

VERSO The lefthand page of a book.

VISUAL A mock up of the proposed appearance of a design or layout presented as a rough drawing, or if more highly finished, as a presentation visual.

W

WHITE LINE A space between lines of type equivalent to the space between lines of type plus the height of an additional line.

WIDOW A single word standing as the last line of a paragraph in typeset copy.

WILD COPY Copy printed separately to be pasted up as part of a chart or diagram, or as annotation to an illustration.

WORD BREAK A division of a word at the end of a line of type to fit the line measure and avoid excessive space between words in the line.

ELECTRONIC PUBLISHING WITH STANDARD GENERALIZED MARKUP LANGUAGE (SGML)[1]

by

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Summary

This paper concentrates on Electronic Publishing of information made up of complex structured text (including technical and scientific notations, graphics and images) in large volumes with a long life cycle and suited for multiple forms of output. In such a scenario, SGML serves as the basic tool in order to achieve a new quality of organizational control and managerial flexibility. The specific features of SGML will be demonstrated describing applications developed within the Association of American Publishers (AAP), the International Organization for Standardization (ISO) and the CALS initiative (Computer-aided Acquisition and Logistics Support) of the US Department of Defense.

1 General application areas

Electronic Publishing has become an umbrella term for many different computer based activities in the production of various forms of information. This paper does not provide one best approach to produce and to publish information in general but concentrates on a certain type of information which is widely required and used under especially challenging conditions. This information is necessary to construct, produce, use, maintain, repair all these complex technical goods we are working with and to establish and to develop the scientific and technological bases we are dependent upon in our modern world. This huge body of scientific and technical information can be technically characterized by the following — publishing relevant — features:

- It is made up of complex structured documents (rich in different text objects presented in a extremely differentiated typography).
- It includes specific technical and scientific text notations, different forms of non-textual elements (graphics, diagrams, pictures etc.), and perhaps in future animated information (movies) and sound.
- It has a typically large volume; single documents can be seen as parts of a higher level body where multiple links between text objects (references and cross references) exist.
- It has a long life cycle (the information has to be kept for at least some years, often for decades).
- Information has to be edited, updated, corrected, completed and adapted very often (at least in technical fields under enormous time pressure).
- It is written, maintained and used primarily within organizations by many people with different interests, preferences, needs and intellectual capabilities (who must be organized and managed to achieve comprehensive, consistent and reliable results).
- It should be suited for multiple forms of output to utilize not only the advantages of traditional publishing on paper but also be prepared to apply new technologies for presenting information and supporting specific and difficult user requirements.
- It has to be produced within minimal time at affordable costs which means today with a high degree of automatization.

- All this has to be done in an environment of constant and still rapid technical development of information technologies which constantly provides new challenges and opportunities for an efficient information management.

2 Organizational control and managerial flexibility

The handling of such information is not simply a task of writing, updating and using more or less automated technical production tools. It is besides these operational aspects especially a managerial task. The more powerful the production tools are, the more authors are involved, the more heterogeneous the environment is, the less the management has control to influence the whole process. The harder the time and economical pressures are, the higher the requirements concerning the accessability and reliability of the generated information are, the more challenging is the task of information management.

Information management needs tools in order to plan, design, oversee and to control the whole process of publishing. What the management needs first is a tool to describe the organizational framework (structure) for the body of information which will be used to produce publications. This framework has to be based on the 'logical' structure of the information and the requirements for its usage. In an ideal situation this strictly informational approach should not be concerned with publishing media, layout questions, technical systems to be used for production.

By separating the structuring of the information from design questions for the production of publications and the publishing media the information becomes independent of all procedural and technical aspects and provides the opportunity to organize the publication process independent of the information itself.

By designing the structure of document classes where the actual publication is only an instance of a document type the management can base all further decisions on how to organize the flow of production, to design the publications and to use new publishing media on this very condensed description of document types. In practice this means that all these decisions can be made on the base of some pages (the document type definitions) which tell exactly what the structure of the whole body of information is — instead of analyzing and overviewing 10.000s pages of information each time a decision has to be made.

SGML is this tool to precisely describe the 'logical' structure of information apart from the information instance and totally independent of any technical or procedural aspects. It is therefore the ideal means to gain a maximum of flexibility to organize and later on to reorganize the flow of production, to add new publication media (e.g. CD-ROM) and to design new methods for the reception and usage of the published information (e.g. Hypertext).

This characterization of SGML may produce the unrealistic expectation that SGML is a means which solves all publishing problems automatically. Not at all! In order to understand what the contribution of SGML in designing the publication process is we have first to look a little bit closer at SGML itself and secondly to see how SGML is applied in different industries and with different objectives. These examples should give us some more precise ideas of how SGML can practically be utilized in order to achieve our own publishing goals.

3 SGML — only a formal language

SGML is nothing more than a language which enables us to convey, with a minimum of technical pre-requirements, human beings or technical systems (computers) how the document instances will be structured. The following gives an example on how to use this language.

SGML is formed by the definition of an abstract syntax (independently from any character set, markup schemes). In a first step this abstract syntax has to be mapped with a concrete syntax. This is done with the so called SGML declaration (s. fig. 1):

```
<!SGML "ISO 8879-1986"
CHARSET
BASESET "ISO 646-1983//CHARSET International
        Reference Version (IRV)//ESC 2/5 4/0"
DESCSET 0 9 UNUSED
        9 118 9
CAPACITY PUBLIC "ISO8879-1986//CAPACITY Reference//EN"
SCOPE DOCUMENT
SYNTAX PUBLIC "ISO 8879-1986//SYNTAX Reference//EN"
FEATURES
MINIMIZE  DATATAG NO   OMITTAG YES  RANK NO      SHORTTAG NO
LINK      SIMPLE NO    IMPLICIT NO  EXPLICIT NO
OTHER     CONCUR NO    SUBDOC NO    FORMAL NO
APPINFO NONE >
```

Fig. 1 Example of an SGML declaration (specifying some markup mininization)

In this case the abstract syntax has been mapped to the reference concrete syntax which is described in the SGML standard. It specifies the use of characters, delimiter assignments, naming rules, optional features etc.

In a second step the structure of document classes is defined with so called document type definitions (DTD) (s. fig. 2):

```
<!DOCTYPE memo [
<!ELEMENT memo    - - (idinfo, body)>
<!ATTLIST memo  status  (final | draft)  "final">
<!ELEMENT idinfo  O O (to+, from, date, subject?)>
<!ELEMENT body    - O (para+)>
<!ELEMENT to      - O (#PCDATA)>
<!ELEMENT from    - O (#PCDATA)>
<!ELEMENT date    - O (#PCDATA)>
<!ELEMENT subject - O (#PCDATA)>
<!ELEMENT para    - O (#PCDATA)> ]>
```

Fig. 2 Example of an SGML document type definition (DTD) (defining the usage of markup minimization)

It is important to stress that the designer of a DTD not only defines the names of a document class and the elements which occur in the instances of such a class but also defines whether elements are required or optional and their hierarchical and sequential relationships. He decides by which attributes certain elements must or may be additionally described (cf. the attribute `status` for the element memo). Various other features can be specified in order to rigidly describe the structure of documents.

The example shows that the document type is named memo. A memo consists of an identification information (`idinfo`) followed by the `body`. Both elements must occur, once. The memo has a `status` attribute with two possible values (`final` or `draft`). If nothing is specified in a document instance the value of `final` is assumed. And so on.

The designer of an DTD is totally free to choose the names, to specify the relationships he wants. There is no criterium from SGML which says whether a defined structure is a good or a not so good one. SGML simply provides a syntax, all semantics are defined by the application. This makes it possible to use SGML for any structural requirements, for any set of objectives.

In a third step the declared concrete syntax and the DTD is used to describe the individual structure of document instances. Again an example, (a) with the SGML markup displayed (s. fig. 3) and (b) in a formatted version (s. fig. 4) how the writer and the readers of the document would see it on screen or paper:

```
<memo>
<to>John Doe
<to>Mary Smith
<from>Joe O'Grady
<date>June 30, 1989
<subject>Personal Holiday
<body>
<para>All personnel are entitled to one
personal day per calendar year.
<para>If you have any questions, please
forward them to my office.
</memo>
```

Fig. 3 Example of an SGML document instance (unformatted version; using markup minimization)

MEMO

To: John Doe
To: Mary Smith
From: Joe O'Grady
June 30, 1989

Personal Holiday

All personnel are entitled to one personal day per calendar year.

If you have any questions, please forward them to my office.

Fig. 4 Example of the SGML document instance formatted

On the base of the declared SGML syntax (s. fig. 1), the DTD (s. fig. 2) and the markup in the document instance an SGML parser is capable of checking the validity of the markup and whether the elements are used in the correct context. The production system — here the formatter — gets only validated data. This makes it possible to use automated production tools which are programmed only on the base of the DTD (without the knowledge of any document instance!). The parsing of document instances ensures that the treatment of all document instances will produce the intended results (with no unexpected surprises).

The example clearly shows that there is no information in the DTD (s. fig. 2) and/or in the document instance (s. fig. 3) which tells how the document should be treated by the production system. In an SGML application this kind of information is stored as usual as part of the production system where the SGML tags are mapped with the appropiate production procedures. The SGML markup simply serves as a means to handle the document — in any way, with any system. Of course, without the (separated) information on how to handle the document, nothing will be done.

Fortunately, with the use of computers this does not mean that a writer or a reader of an SGML document has to know about the formal language of SGML and how to map the SGML markup with processing instructions. It can be programmed in such a way that the user always sees his document in a formatted mode similar to documents in a so called 'What-You-See-Is-What-You-Get'-System (WYSIWYG).

This short description of SGML will give you only a very vague idea of how to use this concept in order to gain organizational control and managerial flexibility as described above. Let us look at three very different SGML applications, their underlying goals and how they are influencing Electronic Publishing in general.

It should be mentioned here that I will not speak about systems which offer a specific SGML support (editors, parsers, database management systems, formatters). They are on the market although not yet as popular as many Desktop Publishing Programs.

4 How to make use of SGML: commercial publishing

It is appropiate first to speak about the use of SGML in commercial publishing although the practical evidence still seems to be rather weak.

In 1983, already, the Association of American Publishers started a project with the title "Electronic Manuscript Poject" where SGML was used — at that time SGML was still far away from being adopted as an International Standard.

The situation in commercial publishing can be characterized as follows:

- Typically authors are not part of a publishing company. Therefore publishers have only a very limited control over their authors. They cannot — for example — prescribe which computer system and which textprocessing program must be used.
- Authors (especially technical and scientific ones) are writing for more than one publishing company. Therefore they don't accept company specific regulations on how to prepare manuscripts.
- Authors are increasingly using computers to create and to edit their manuscripts. They expect that their manuscripts in machine readable form will be directly used to produce the publication in order to save proof-reading work and to shorten the time between delivery of the manuscript and the publication date.
- Authors want to be free to format their manuscript as they like. This is not necessarily the taste of the publisher.
- Most of the technical and scientific publications contain contributions from many authors, from different locations. The publisher has to merge all contributions to produce the publication.
- The publisher has to work on the manuscripts supplied by authors to achieve a useful product for readers which includes a unifyed layout designed by publishing professionals.
- Authors and publishers cannot accept the technical limitations of specific technical systems regarding layout capabilities and character sets. Especially in technical and scientific publishing they must be free to use a lot of special characters and scientific symbols, to produce complex tables, mathematical expressions etc.
- The publisher wants to save production time and costs to gain profit from publishing.
- Typically the production of publications is not done within the publishing company but by independent suppliers e.g. typesetting and printing shops. The publisher wants to be free in order to choose the supplier who offers the appropiate service at low prices and within a timelimit. Therefore the publisher cannot accept any dependencies between the coding in the manuscripts and specific production systems.
- Once published the publisher may want to produce a new edition using a different supplier with different technical equipment and production procedures.
- The publisher wants to be prepared to reuse the published data in a different form, may be on different publishing media.

Using SGML and standardized document types developed by this project[2] in cooperation with publishers, authors, editors, librarians etc. leads to the following prospects:

- Authors are not forced by publishers to apply certain machines, programs or layouts but only a content oriented markup scheme. The manuscripts can easily be transferred between different systems, the correctness of markup can be checked automatically by parsers when the electronic manuscripts are imported in the computer system of the publisher.
- Contributions from many authors can be merged without importing different layout designs.
- The publisher can organize all internal work independently from the authors' systems in one way. The copy editors can use one editing tool for any manuscript.

- Special characters, scientific notations, graphics, animated pictures, sound etc. can be included in the manuscript — if necessary — simply by setting references in the manuscript. These references are unambigously declared and can easily be found by automated tools.
- The ratio of manuscripts directly used for the production of publications can be increased. The authors save proof-reading work.
- Production time can be reduced because all programming for production can be done on the base of the known DTDs. After the manuscripts have arrived and been edited the following production of the publication can be done with automated tools.
  The technical interface between the publisher's system and his suppliers is based on the standardized DTDs. The supplier can use the same interface for the input of all manuscripts which apply these DTDs (not necessarily from this one publisher). Only the mapping of the standardized markup with individual processing instructions to achieve individual layouts outside of the manuscripts has to be done. These mappings can be prepared before the manuscripts arrive. This approach saves time and money without inhibiting the freedom to change layouts, to replace production components etc.
- The data — free of any procedural and system dependent instructions — can easily be reorganized for new editions and used as input for the production of new publishing media.
- Authors, publishers and typesetters can adapt their systems as they like without interfering with the system decisions of their partners in the publishing process.

5 How to make use of SGML: International Organization for Standardization (ISO)

The International Organization for Standardization (ISO) could be seen as a commercial publisher. Within this organization an own SGML application[3] is under development which differs from that of the AAP. Why are they not using the AAP application? The answer is very simple: ISO has unique requirements for establishing organization control on their authors.

Their document type definition for International Standards reflects the extensive, elaborate, detailed and unique author guidelines in order to achieve a body of standards where the content and its structuring is consistent over the boundaries of singular standards.

Differing from the intentions of the AAP project, the ISO application is primarily intended for inhouse usage. This means, it is not expected that the authors of standards are using the ISO-DTD directly for writing their drafts. In order to achieve a maximum of consistent structuring the final version of all standards are (normally) retyped in the ISO Central Secretariate in Geneva and later on typeset inhouse.

What are the advantages compared with a conventional publishing approach?

- ISO is able to typeset automatically (including page-makeup) all standards with a high degree of consistency and reliability.
- It establishes a model for national standardization bodies with which they intensively exchange documents (national standards are used as a base for international standards and vice versa).
- ISO prepares itself to offer standards on new publishing media (as text databases or Hypertext products) in the future.
- It creates a base for an electronic authoring system which in the future can be used worldwide and serves as an organizational tool to oversee the complex and confusing process of developing standards.

6 How to make use of SGML: US Department of Defense (CALS)[4]

As you know already the most important part of an SGML application is the DTD as the precise description of how the documents are or should be structured. I was told that when the US-DoD

started its initiative to establish one concept for the technical documentation of weapon systems across the boundaries of Air Force, Army and Navy it was seen as impossible. In the meantime the DTD exists as the most important publishing standard of the Computer-aided Acquisition and Logistics Support (CALS) initiative.

The initiative has a very clearly formulated goal: "It is my goal that the Department of Defense (DoD) will establish plans to acquire, process, and use logistic technical information in digital form. Insofar as possible, this shall be accomplished for new major weapon systems entering production in 1990 and beyond.[5]"

The more operational goals are to:

- automate the logistics processes
- increase DoD capabilities for receiving and handling information in digital form
- bridge 'islands of automation' in DoD and industry design and logistics processes
- gain benefits of a highly automated and integrated system (reducing paper, improving timeliness and accuracy of information, designing more supportable weapon systems, reducing costs)
- replace paper deliverables by electronic formats (in later stages)
- apply the concept first to maintenance information only, later on to be expanded to other areas.

The specification for the SGML portion of CALS is layed down in the military specification MIL-M-28001[6]. It specifies:

- Procedures for use of SGML
- SGML compatible codes for markup up documents conforming to MIL-M-38784B
- The basis of a baseline tag set (data dictionary)
- The formatting attributes to be applied to each document component
- The interfaces for additional tagging schemes.

MIL-M-28001 is besides its relevance for all suppliers to the US DoD and SGML software developers an excellent example of how to design and to document such a complex application as CALS offers.

Similar SGML projects in the defense area are started in Canada, Sweden and Australia. Defense departments in several other countries are augmenting these developments carefully and will probably adopt at least major portions of the CALS concept (including the application of SGML).

The serious work to achieve the described goals in time and the early commitment of the DoD to apply SGML in this concept created a big and strong demand for systems which provides a specific support for processing SGML documents. Insofar the CALS-initiative brought the breakthrough for the acceptance of SGML (and other standards related to publishing) in other industries.

The very abstract SGML concept alone was not able to convince people in general to make use of SGML; only with the availability of systems which made and will make it easy to handle SGML documents and to exploit its potentials it is rapidly becoming accepted in all kinds of industries where huge bodies of information have to be handled.

Together with the invitation mid last year to speak at this meeting, I received a paper written by Kurt Molholm — today our session chairman — about the "planned use of Standard Generalized Markup Language at the Defense Technical Information Center". There he still expressed a lot of scepticism whether it would be possible to apply SGML resp. MIL-M-28001 to deal with the complexity of the DTIC-documents and the huge amount of pages they have to integrate in their planned Electronic Document System (EDS). I would very much like to hear from him whether he has changed his mind in the meantime. As a commercial supplier of SGML based publishing systems I may be a hopeless optimist: At least I am fully convinced that the time has come to build such big and complex systems on the base of SGML with available competence and technical tools without much risk.

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ELECTRONIC MAIL SYSTEMS

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SUMMARY

Electronic mail, or the use of computers and telecommunications networks for transferring messages, has been available to users of computer systems for a number of years. It's early availability was restricted to specialists and to those who had ready access to telecommunications facilities. More recently it has become widely available with a number of competing public services, many originating in the USA.

A new CCITT/ISO standard known as X400 has been agreed which is designed to facilitate the interaction between previously incompatible electronic messaging systems. It is expected that the availability of services supporting the X400 standard will contribute to the wider use of electronic messaging as a business and technical communication tool.

However, in the same time frame, the general availability of equipment for productivity enhancement based on microprocessors, generally classified as the Information Technologies, has left many users or potential users of messaging systems with a bewildering choice of facilities.

This presentation will review briefly the developments and then concentrate on the integration of message handling in the more advanced systems.

In so doing the emphasis will be on the different functions which can and should be covered by planners of messaging services. Direct services such as telex, fax and interpersonal messaging will be treated as well as the indirect facilities of gateways to external databases, intelligent interfacing and personal information management.

A number of different scenarios will be presented which will illustrate how existing equipment and infrastructure can be more efficiently utilised to provide integrated services.

INTRODUCTION

Electronic mail (E-Mail) has been available to the specialist personnel involved with computer systems for a number of years but has only become available as a tool for general computer users in the last five years. The concept is very easy to understand but it's acceptance in the general scheme of interpersonal messaging has been rather slow. This has been partly due to a lack of coordination between the designers, the operators and the users on the ergonomics of the systems as well as a less than critical mass of user groups suitably equipped to use the services as a substitute for more traditional means of communication.

The technical basis of E-Mail has not changed very much if at all since it was first introduced. E-Mail makes use of the possibility to divide up the storage space of a computer into 'mailboxes' allocated to individual users and to load a software into the computer which manages the transfer of messages in and between mailboxes. Users who are connected either directly or remotely to a computer thus programmed can write, read, edit, annotate etc., messages in their own personal mailbox and send, read, forward or otherwise deal with messages they have composed or which have been sent to them.

In recent years a number of public services have started up which offer E-Mail to the general public, in theory, but in practise to groups of individuals who have a common reason to communicate. These services are competitive, especially in the USA, and offer incentives of various kinds to potential customers. However, the main reason why people sign up with these services is either because they can communicate with their peers or with people in similar employments or because their employer has signed a 'global' arrangement. In addition to these public services all the main computer manufacturers offer an E-Mail package for their systems and install these on their customer sites, especially those where there is a large central computer service with terminal connections perhaps spread over a number of physical installations.

Therefore the possibilities for individuals to have access to E-Mail in the last few years has opened up considerably. Unfortunately the different service offerings are, for the most part, incompatible in a technical sense and, in a telecommunications sense, isolated. This despite the fact that many of them are available to their customers via public telecommunication facilities.

The development of E-Mail is therefore restricted by a lack of universality in its application.

This paper will review the possibilities for integrating further functions into E-Mail systems as well as examining the prospects for interconnection of services. It will concentrate as far as possible on interpersonal messaging of the one to one or one to many type but it should be realised that many of the functions can be applied to conferencing which is the subject of a separate paper at this conference.

BASIC MESSAGING FUNCTIONS

At the most basic level E-Mail services provide a capability to simply write text messages into a system for delivery to other users in the same system. This functionality can contain simple editing capabilities for the message and offer possibilities to send the same message to a list of receivers which has been set up in advance. At this level E-Mail is akin to memo generation inside an organisation and suffers from the same drawbacks for example ensuring that receivers actually read and act on the message.

One of the principle difficulties with any messaging system is ensuring that it is used. Even simple notice boards are no guarantee that passers by will read the messages. This problem is aggravated in E-Mail systems by the necessity for users or potential users to physically connect to the system in order to read their messages. This requires a discipline from the users to connect perhaps several times a day. In addition, if the system is to be universally applied, it requires that 'non computer' people use a terminal device. This latter requirement is very often overcome by higher executives allocating the E-Mail reading tasks to secretarial personnel, defeating thereby one of the main purposes of E-Mail, the elimination of paper based systems for routine information and queries.

Basic E-Mail systems have been augmented by various techniques in order to overcome these drawbacks. One of the most effective is the call out system by which a message sender can activate a telephone call to the receiver which will inform him or her that a message is waiting. This assumes of course that the receiver has been willing to notify a telephone number for receiving such calls !

Another technique which is gaining ground is the automation of the downloading of messages into a users (personal) computer at predetermined intervals. This procedure ensures that even if the user is not physically present at his or her terminal or even in some cases whilst they are present but occupied in another computing task, messages can be retrieved from their mailbox and loaded into local computer storage. There is of course still no guarantee that the messages are read !

Yet another technique is recorded delivery of E-Mail messages. In this case the sender can request that he or she be informed when the receiver(s) have received the message - again only assuming it has been read.

All of these facilities can be considered as basic productivity aids which help to ensure the acceptability of E-Mail or assist in assimilating it into the users work pattern. They do not unfortunately provide a seamless integration with those user work patterns which involve other (paper based, for example) communication systems or even with other telecommunication based systems.

Whilst it is not expected that electronic systems can replace completely paper based systems nor is it even desirable in many cases, there are opportunities to correlate certain functionalities in todays world which will improve the acceptability of electronic systems in many applications.

INTEROPERABILITY AND INTEGRATION

E-Mail, to be acceptable, has to be seen in the context of the changeover from traditional to electronic message transfer techniques which is presently underway.

No one except a confirmed recluse would deny that the telephone has revolutionised communications at an interpersonal level. At the business or professional level it may be considered as a burden to be borne but it is essential to the carrying out of ones functions in almost any activity. Despite its all pervading nature in business its efficiency and convenience make it acceptable. This acceptability took a relatively long time to achieve and in many underdeveloped countries it is still at a low level of penetration. This is because, and it was the same in the developed world up to the middle of this century, a certain infrastructure is require in order to achieve penetration. It is the same today with E-Mail.

However, the indications are that the means are in place to provide the sort of functionality that the telephone has, for electronic messaging. These means are presently dispersed and will require not just technical actions to interconnect them but also organizational actions.

To examine first the means. The personal computer has become for most executives whether civilian or military an indispensable tool for carrying out certain functions. These may be as mundane as letter typing but there are significant productivity gains even at that level. We all I think have experienced the reluctance of secretarial staff 'of a certain age' to espouse word processing. However, I think most of us can also report that the convenience of correction or incorporation of new material into texts has overcome any initial reluctance. Word processing, despite certain drawbacks associated mostly with ergonomics has replaced typewriting as a common office function. It has done so because it does not require a significant change in the actions performed and it has obvious practical advantages. In the personal computer as opposed to the stand alone word processor there are means available to store and index the documents that have been created, thus eliminating, if desired, the filing in paper form of the documents. So the first step towards the creation of the electronic message is already in place. There will be organisational problems concerning the filing function and they will require a reexamination of the procedures in use, but the electronic version of the information will exist.

It is interesting to note that in recent times many office sites have installed facsimile or fax machines. It is also interesting to note that many faxes are sent after they have been created in word processors, printed on (adjacent) printers and then fed into the fax machine. They may even have been photocopied to increase the contrast !

If one considers the interoperability functions of such a procedure it is obvious that the fax should be created directly from the electronic form of the document and connected directly from the PC to the telephone line. The reason it is not in most cases is again due to commonalty of functions. Feeding a fax is similar to photocopying, itself an improvement on lithographing, therefore it will find acceptability, especially when the fax can be programmed to dial certain often used numbers automatically. A similar set of functions can be ascribed to the use of the telex machine. It is not unusual to find typed or word processed documents being re keyed into telex machines to create tapes for multiple destinations.

It is therefore clear that the interconnecting of the facilities used to create and transmit messages is technically possible but does not yet meet the basic criterion of acceptability; that of being as easy to do as the previous method.

If one adds to these messaging activities the need to search and retrieve information from local or remote data stores then one is extending the concept of messaging to include a whole range of data types which have not previously been considered in the same functional class. Again the technical facilities exist to integrate these capabilities into the office or technical workplace but, especially in the case of remote data stores, the acceptability criterion is again missing.

Therefore planners of messaging facilities have to take into account in a much more effective way than in the past the real requirements of the user population and the need to increment the integration of new facilities with the old. The last part of this document will examine one or two scenarios which illustrate how this might be achieved.

THE FUTURE SCENARIOS - HOW REALISTIC?

To start with a scenario which assumes the minimum disruption of the present technical environment. This is based on the assumption that the office or technical work place has reasonably powerful personal computers and has telecommunications facilities (telephones).

An electronic mail server (computer and software) which is available through the telecommunications can provide the following functions : Message sending and receiving, Telex sending and receiving, Fax sending for all and receiving for some specially equipped devices and voice messaging for all. This without any new wiring of the office or work place. For no extra physical investment but with some extra training data services access can be provided at various levels from direct access to data bases by the users to the use of gateways which translate the question into the required syntax for the database. Thus a user group can be provided with an extension of their functionalities at minimum extra effort and with only rudimentary extensions to their software store.

In another scenario one can imagine a group who already have access to a messaging system on site but who wish to access other messaging systems. There are two solutions available today to this problem. The first and most expensive is to create a connection via telecommunications to the other system - assuming that the technical features are compatible, which as pointed out above is not very likely. The second option is to use an intermediary service which can be likened to a railway turntable system and which picks up the messages from one system and converts them into a suitable format for the other and vice versa. This procedure can be networked via message switchers which act like telephone exchanges and provide facilities to exchange longer messages and computer programs using what are called protocol interfaces which envelope the data in a protective shell and ensure its safe delivery. This solution is also expensive but it is promised to be more universally available via the telecommunications authorities backed X400 standard which is just coming on the market.

A third scenario foresees each person in a work group equipped with a powerful desk top communications device which combines the functions of telephone, computer, mass storage controller (supporting Compact Disk or Laser Disk mass storage devices), an image processor and connected to a broad band (greater than 2 megabit transmission capacity) network both on site and to remote locations. This scenario is technically feasible today but is not realised except in some "advanced" environments and for some special applications. It is not possible today to consider the seamless interconnection of the functions mentioned because of lack of standards on the one hand and lack of a universally available broad band communications system.

CONCLUSION

E-Mail, the basic messaging facility available today which makes use of the computer and telecommunications has the capability to become the centre of personal communications in the future. To achieve this it will be necessary for both the designers and the specifiers of communications systems to realise that users, who are not illiterate by any means but who may not be and should not be required to be computer literate, will want to use the systems. Todays facilities contain all the ingredients, they need to be augmented with ergonomic and functional features as well as the capability of replacing existing techniques in a painless fashion for them to become the truly useful tools of the future.

COMPUTER CONFERENCING: MINDS MEETING ANYWHERE/ANYTIME

by

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Computer conferencing systems provide an effective means of group communication without the limitations posed by real-time interactions (e.g. audio and video tele-conferences) or physical location (e.g. face-to-face "traditional" meetings). Using various components of the myriad of telecommunications facilities available today, they provide a means of sharing the collective memory of a discussion among two, two hundred or two thousand participants who may be scattered around the globe. This paper provides a description of this concept, discusses potential applications and indicates key factors required to make computer conferencing successful.

The cornucopia of technologies that has become available in the computing and telecommunications field during the past ten to fifteen years has spawned a myriad of interesting and exciting new electronic publishing, communication and information exchange / dissemination applications. In following trends and developments in this field one must frequently admit that today we are often more fettered by the limitations of our imaginations in creatively using the facilities and services at our disposal than by the limitations of the available technologies. In the context of this Specialists' Meeting, one particularly exciting and appropriate application that takes advantage of many of these new technologies whose potential is still far from fully utilized is **computer conferencing.**

Combining many elements of both computing and telecommunications technologies, computer conferencing provides a computer-mediated method for effective individual and group communications without the limitations posed by real-time interactions (such as telephone calls, audio and video teleconferencing) or location (as is the case in getting people together for traditional face-to-face meetings). While the logistics and specifics of the systems involved will vary, in concept computer conferencing systems provide a means of sharing the collective progress of a meeting (and a common memory of it in the form of an on-going record of the discussion) among two, two hundred or two thousand (or more) participants in a group interaction. Sometimes termed the "virtual meeting", participants can join a computer conference at their own convenience (in terms of time of day and physical location), read what has already transpired in the meeting, add their "voice" to the discussion or contribute new thoughts and then exit from the "conference" to return at another convenient time. In most conferencing systems an electronic mail module is available for "corridor chat" or "whispers" -- one-to-one or one-to-a-few messages that are not for the "meeting" as a whole.

In practice, many of the exchanges in computer conferencing discussions are not unlike many other types of scientific publishing and communications as they provide a means of fostering scientific discussion. The content of the messages in a computer conference often falls somewhere between that of a telephone call or of formal letter or statement. Some conferencing systems are used as a type of "electronic publishing" and have special purpose modules to facilitate the uploading and downloading of files. As a technique or as a telecommunications application, computer conferencing can be used (and is being used) for a very wide range of activities. These include,

- scientific / research communications
- collaborative research and writing
- intra-organizational and inter-organizational communications
- project management
- common / special interest groups
- planning activities (e.g. planning traditional meetings)
- distance education
- computer mediated support for local (e.g. on campus) educational activity
- continuing / professional education
- product training and on-going support
- data and software exchange
- electronic publishing
- personal /recreational interests
- pre-conference participant preparation and post-conference follow up

This list can be viewed as being completely open-ended, potentially encompassing all types of interactions where the flexibility of time and location independence can be combined with the generation of a common, open-ended data-base of the contributions to the discussion.

In the normal use of the term, computer conferencing is based on a "host" system that is accessible to participants via a variety of telecommunications links (simple voice grade telephone lines, dedicated data links, private

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This paper was presented by Mrs Ellen Pearson, Associate Librarian of the University of Guelph.

or public packet switched networks, etc.) with the participants using access devices ranging from "dumb" computer terminals (TTY "glass teletypes" or simple printing terminals), MINITEL terminals, microcomputers, personal workstations or via the call-out facilities of other computer installations. Participants "signs on" or "logs in" to the appropriate computer conferencing host from a personally convenient or available location and are normally presented with an indication of what new messages have come in since the last time they were on the system. They can then read these waiting messages in the first conference in which they are interested, make comments on them if desired, introduce new contributions and then proceed to "join" the next conference on their list thus repeating the process. Each time a user signs on to the conferencing host they are informed of any new waiting messages, but, in additional, all the previous messages in their various conferences are still available for review and further comment, thought or action.

A decade ago the operation of such a "host" service required a very large, mainframe computer system, but today excellent full-featured conferencing host systems are available for machines ranging from IBM AT machine types (Intel 286 microprocessor based) to a Cray and can be implemented under a wide variety of operating systems. A number of commercial (or at least publicly available) computer conferencing systems operate around the world and many organizations maintain such systems for their internal use. For example, the CoSy conferencing system developed at the University of Guelph has been implemented as a host system at more than 100 sites around the world -- in universities, corporations, research organizations and as public service bureau or a commercial offerings. Similarly, PortaCOM, developed in Europe and based on the pioneering Swedish computer conferencing system COM, has been implemented on at a number of sites in various types of institutions.

In addition, what some people view as "pseudo-computer conferencing" is conducted, often with very large quantities of messages flowing, on file transfer networks such as BITNET and EARN through the use of "LISTSERVERS". These software applications facilitate the distribution of discussion contributions on file transfer networks in a way that achieves some of the functionality of the computer conferencing concept but takes direct advantage of the low cost file transfer network services. In another variation, "distributed conferencing systems" are now appearing which allow the creation and maintenance of parallel conferences or discussions on multiple hosts with the users access the host nearest (or easiest or least expensive) and the hosts communicate with each other periodically (hourly, a few times a day, daily, weekly or whatever is required to support the discussion activity) to exchange the appropriate messages. This approach, which can also take advantage of file transfer networks, presents particularly interesting opportunities for the expansion of computer conferencing on a global scale, especially in those parts of the world where individual access to data communications links is either very difficult or very expensive (frequently both).

In common with other types of computer-based messaging systems, the "asynchronous" nature of computer conferencing has a number of advantages for many types of communications, particularly in the area of scientific, research and scholarly communications. These advantages include,

(1) time independence - the end of "telephone tag". Many scientists and researchers interact with colleagues on a global basis, across many time zones and frequently find it difficult to establish "real time" telephone contact with people across the country, on the otherside of a continent or halfway around the world. In most countries the postal systems have become too slow (and the pace of life too fast) to maintain the use of the mails as a regular means of research communications. Computer based messaging systems eliminate this problem as they allow both the sender and receiver to transmit / receive information at their convenience;

(2) time independence - elimination (or at least reduction) of the "instant response" or "off the top of the head" reaction, unfiltered by thought and consideration. When someone is on the other end of a trans-oceanic telephone call there is a strong temptation to provide an instant response to a question, a thought or a comment. Computer based messaging systems provide an opportunity for reflection and a thoughtful, considered response;

(3) facilitation of multiple language discussions. Real time verbal interactions with participants who may not be completely fluent in the language being used can be difficult, time consuming and often very frustrating. Being able to read a message at ones own speed, digest it, perhaps seek aid in translating key points and then making a response can be a much more satisfying mode of communication;

(4) the potential for the reduction of at least some travel now used as a means of scientific and scholarly communications. Computer based messaging systems will never eliminate the necessity nor the demand for face-to-face meetings. Nonetheless, in these days of increasing pressure on everyone's time, declining research budgets and growing travel costs, any means of reducing unnecessary travel will be welcomed by all concerned. Perhaps even more important, computer-based messaging systems can serve to facilitate the preperation for face-to-face meetings, participation of of those who could not attend the meeting and follow-up after a "real" meeting.

In addition to these features shared with other types of computer based messaging systems, computer conferencing systems offer a number of special advantages of particular interest to those in the scientific and research community:

(1) by their very nature, they provide a type of structure and organization for the discussion as well as a collective memory for the group;

(2) they create an open-ended data-base of the interactions in discussion or exchange of information and, depending on the specific conferencing system, this "knowledge-base" may be searched to retrieve material from the on-going discussion;

(3) they create a common, easily identifiable sequence in which messages are added to a discussion and thus provide an easy way to refer to specific contributions or to time and date stamp when something was said;

(4) this "instant transcript" of the discussion that is created by the conferencing system can be distributed to others as is, or edited and formatted and published to meet particular needs;

(5) particularly powerful computer conferencing systems provide easy means of linking concepts or items in a discussion and this linkage is shared by all participants in the conference.

A number of critical factors can be identified that will affect the success of computer conferencing activities and which should be borne in mind by those who are considering the active use of such systems. In broad terms these can be divided into two groups, "social or organizational" and "technical". Among the critical "social/organizational" factors are:

(1) participants must have a **need** to communicate and,even more important, a **willingness** or **desire** to do so. As is clearly indicated by the name of the pioneering computer conferencing system in the United States, EIES [the Electronic Information Exchange System], the **exchange** of information is central to this concept;

(2) normally each computer conference has a **moderator** who has some organizational and technical responsibilities for the conference, but, must also play a key role in stimulating and guiding the discussion in an active fashion. Given the potential for cultural, linguistic,geographic, educational, professional variations among the members of a computer conference, this role is frequently **absolutely critical** to the success of these activities;

(3) the presence in the conference of a key participant (or key participants) who by their stature in the field, articulate contributions and general reputation can bring others into active involvement;

(4) peer group participation: success breeds more success in this activity as in most others. If people feel they **must** participate, then the word will spread and the effect on involvement will be cumulative;

(5) participation in computer based conferencing activities must be seen as a "good thing" in institutional terms or people may hesitate to take the time to become seriously involved. This goes beyond simply providing the means (technological and financial) but must also include ways of recognizing contributions made in this fashion as being as valuable as those done in "traditional" ways;

(6) the absence of any national political or legal barriers or inhibitions to the "free flow" of information. Such barriers can range from legal prohibition of the use of computer based messaging systems to very high taxation of equipment and services or expensive telecommunications network access.

Among the "technical" factors that will directly affect the success of a computer conference one must include,

(1) ready access to access devices (terminals or personal computers and modems);

(2) ready access to telecommunications facilities and services

* local dial up voice grade lines
* leased voice or data circuits
* packet switched network access
  [nationally and internationally]

(3) a stable, easy to use conferencing host system providing the features required for the particular information exchange activity planned - and preferably with gateway links to other systems;

(4) appropriate means of addressing concerns about the "security" of messages and information exchanged via such systems by ensuring that good operating procedures are adhered to and all necessary systems security measures are taken. In addition, provision may be made for encoding messages as part of the host conferencing system itself or for the use of appropriate software by participants to encode messages before they are transmitted to the conferencing host;

(5) good technical support for use of the conferencing host

* manuals
* user training
* on-line "help" and assistance
* alternative access to technical support (e.g. by telephone or telex).

A decade of computer conferencing activity around the world has led to many successful applications of these techniques to a wide range of situations and applications of the types indicated above. The pioneering EIES [New Jersey Institute of Technology] and COM [Stockholm University] systems have been joined by many others in the 1980s to offer a wide range of conferencing opportunities. What is often surprising is not the number of successful applications of computer conferencing, but the fact that it has not become even more widespread in use, particularly in scientific communications. One can suggest some reasons for this including,

(1) "technophobia", "terminal fright";

(2) lack of telecommunications infrastructure or terminal access decices;

(3) lack of systems interconnection - the existence of multiple conferencing hosts to some extent has fragmented activity in this area;

(4) lack of awareness of the possibilities - and the value of opportunities such as those presented by this panel to discuss the possibilities presented by the availability of such systems;

(5) the possibility that maybe people really don't want to talk to each other at least not to the extent we sometimes believe. The volume of messages exchanged on networks such as BITNET, EARN, ARPANET, USENET, etc. would indicate that should not be a problem.

As a genre, computer conferencing systems do have the potential to greatly facilitate world-wide collaborative activities among scientists, researchers and scholars. It is a "natural" for use by the AGARD community in the years ahead. Combined with ever improving telecommunications and computing facilities (from personal workstations to major central computer installations) it can be a very powerful tool for the transfer of information in all areas of research and development.

APPLICATIONS TO THE AEROSPACE AND DEFENSE R&D COMMUNITY THE DOD COMPUTER-AIDED ACQUISITION AND LOGISTICS SUPPORT (CALS) INITIATIVE

by

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SUMMARY: The U.S. Department of Defense (DoD) Computer-aided Acquisition and Logistics Support (CALS) initiative is directed toward improving the design, development, and support of weapons systems through the use of current and emerging computer technology. CALS emphasizes greater utilization of information contained in DoD and contractor databases to provide optimum, economic weapon system support using electronic transfer of information to the maximum amount possible.

INTRODUCTION: I recently read that the first F-4 fighter aircraft built in 1958 had 500,000 pages of technical and training documentation and that the B1-B bomber has doubled that amount - a million pages, nearly 1/3 mile of paper.(1) Additionally, 20 percent of these million pages require annual updating. I understand the B2 bomber will be supported by 2 million pages of technical documentation.(2) That's both a lot of paper and a lot of complexity. Someone from NASA told me that if the technical manuals on board the U.S. Space Shuttle could be placed on CD-ROM or some similar technology and a device to read them could be placed on board the spacecraft, the result would be the ability to add one or two more people to the payload.

As you can tell from my title, I am not from an aerospace research and development organization - nor have I ever been. In fact, most all of my career I've worked in the area of logistics support of operational systems. Why then is it appropriate for me to speak at this session - a session discussing applications of electronic information transfer to the aerospace and defense R&D community? There are several reasons, but I'll limit myself to two. First, logistics concerns are encountered in the earliest phases of the weapon system acquisition process and continue as problems to be resolved throughout the systems lifecycle. These include initial implications of systems design; specification, development, and delivery of logistics and technical information; planning and control of funding and resources to ensure the timely response to related requirements; definition of interfaces between DoD and industry for procurement and fabrication needs; development of support concepts and maintenance strategies; and dealing with all changes that impact system support. It seems reasonable that the sooner potential logistics problems or poor interfaces are discovered, and solutions for them developed, the more reliable a weapons system will be and result in higher availability to perform its mission.

The situation being addressed, however, is far greater than just the development of weapons systems. This background statement from the SAE Specification for an Automated Interchange of Standards Data points this out:

> "The aerospace industry, government agencies, and industrial societies share a common interest in exchanging data in electronic form because the exchange of information in printed paper form is proving to be more costly in overall handling and use. Also, as industry and government continue their evolution toward higher levels of automation, the need exists to provide data in machine sensible form so that computer systems can process and operate on the data."(3)

Thus, the second reason for my speaking here. The organization I represent is a key element of the U.S. DoD Scientific and Technical Information Program. Scientific and Technical Information (STI) importance in the defense and aerospace environment is pervasive. The capability to effectively and efficiently use the enormous amounts of information - to filter, digest, consolidate, reorganize, add, transfer, and share it - is critical to both the economic health and the defense strength of the NATO member nations, as well as to the strength of the alliance itself. The CALS Program is a strategy designed to create within the DoD - and the Defense industry - an integrated "system of systems" that can create, transform, store, reproduce, change, distribute, and use information as it evolves through the design, manufacture, maintenance, and logistics support of Defense weapons systems and equipment. The specific focus of CALS is on the automation of weapon system technical information over the system's

life cycle, but the information transfer problem being addressed by CALS is a generic one. It's a challenge of all who manage or use information - obviously this includes nearly everyone.

BACKGROUND: Planning and implementation of CALS began with a joint DoD/Industry study and continues to be managed as a joint effort. In April 1984 the Institute for Defense Analyses was tasked jointly by the then U.S. Undersecretary of Defense for Research & Development and the Assistant Secretary of Defense for Manpower, Installations, and Logistics to assemble a task force of senior industry and government logisticians to examine the challenges faced in applying new and emerging computer technology to improve the logistics support process. The task force was given a charter to "develop a strategy and a recommended master plan for computer-aided logistics support."(5) Thus began one of the largest - and most fundamental - changes in the way DoD and its contractors will develop weapons systems in the future. It is more than just a better way to transfer technical information and data. It changes the relationship of the developers and the logisticians by allowing all elements to participate very early in the development process. It allows the full application of the concept of concurrent engineering. (See FIGURE 1.)

CONCURRENT DESIGN

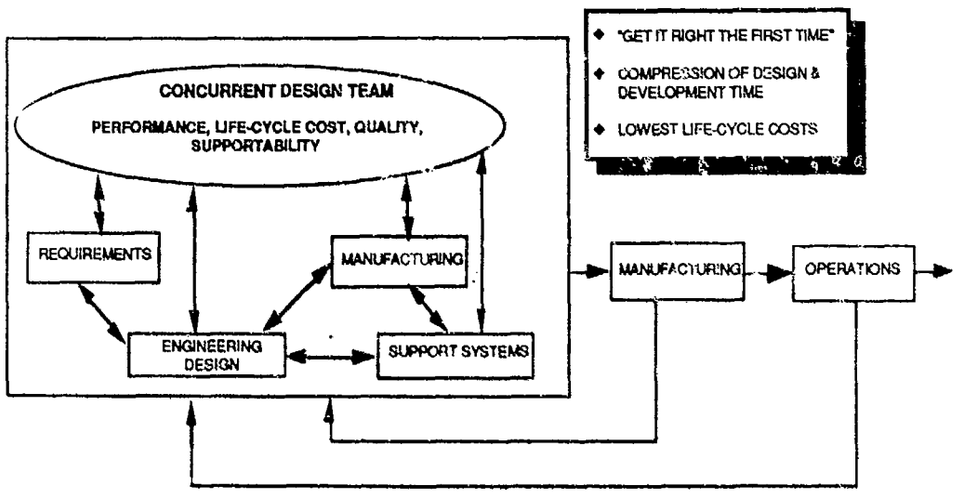

FIGURE 1

In a study the Institute for Defense Analyses (IDA) defined concurrent engineering as follows:

> ". . . a systematic approach to the integrated, concurrent design of products and their related processes, including manufacture and support. This approach is intended to cause the developers, from the outset, to consider all elements of the product life cycle from conception through disposal, including quality, cost, schedule, and user requirements."(6)

The IDA study found, among other things, that "Companies that have implemented concurrent engineering report that they are producing higher quality products at lower cost and in less time than they were able to previously." The CALS mission is to improve the entire weapons system acquisition and support process. The titles of the four working subgroups of the original CALS task force indicate the magnitude of the task:

Policy/Legal Constraints Subgroup - included intellectual property rights and the wording of contract clauses.

Architecture Subgroup - included consideration of such things as where datastores should reside, interoperability and relationship to existing databases.

Information Requirements Subgroup - included determining what data is required, how that data relates to current data delivery requirements, and how the transition from paper data to digital delivery is to be made.

Technical Issues Subgroup - included such things as format standards for graphics and text data that permit exchanges between incompatible hardware/software systems and access control and integrity.

WHAT IS CALS? Presently, most engineering drawings and related narratives are produced on paper. Such blueprints are not always legible, are difficult to transmit to other users, and require a large amount of storage space. DoD's CALS Program will require "paperless" acquisition of technical data. This will include digitization of engineering drawings, their electronic transmission, and electronic ordering/payment for technical data. The strategy will be to not contract with suppliers who are unwilling to do business in a "paperless" mode. Digitization of technical data and automated ordering/payments will improve data quality, speed up data access, and reduce data storage costs.

The irony is that most design, engineering, and manufacturing, aided by Computer Aided Design (CAD), Computer Aided Engineering (CAE), and Computer Aided Manufacturing (CAM) technology, is done without relying on paper. The drawings are produced to meet contract demands for supporting documentation and archival purposes. A further irony is they are quite often moved from paper media to another media, probably microfiche. From this storage media they may again be printed back on paper if the final use requires this media.

Several undesirable conditions result. For example, CAD is designed to allow three dimensional representations and allow these representations to be viewed from different perspectives at a user's command. Drawings are two dimensional. Thus, printing a CAD representation does not provide a complete picture. Second, the progression from electronic media to paper to microform to paper again results in some degree of loss of clarity. Finally, it is duplicative - requiring multiple input and output functions to be done that add nothing except change the media. Added to this is the probability that this is occurring many times for the same data shows the potential for substantial savings in both time and money.

All of the objectives of CALS can be reduced to three basic objectives:

1. Reduced acquisition and support costs.
2. Improved quality and timeliness of technical information.
3. Improved responsiveness of industry.

As CALS is implemented the benefits will be many. Logistics consideration will be included in the initial design and thus increase weapons system reliability and availability. The weapons system acquisition process will see increased efficiency. Weapons systems costs can be reduced through the possible use of existing parts, by reducing the number of duplicate items, and allowing more interchangeability and substitutability of parts. Improved planning through the CALS, the potential for increased competition, and the identification of more sources of supply, plus the ability for faster procurements adds up to lower costs and better supported weapons systems. One article I read stated that the U.S. Air Force will save $135 million annually just in the cost of updating manuals.

WHO WILL USE CALS? Although its title may lead one to believe that CALS has an audience limited to mostly the logistics community, this is an incorrect assumption. CALS deals with the whole set of deliverables to the government and covers the entire life cycle of a military product. If, for example, a CAD/CAM system can manipulate data to display an entire system - or a portion of a system - from many angles then why can't that same data be used for training. Why not add some animation and sound and have a moving, talking picture replace a static picture in a technical manual? Why not provide the maintenance person with a small, portable display device that can dial into the appropriate database and then display the data in an animated form? This could result in not only savings in paper but in reduced training because the training guides and maintenance hints could be incorporated into the displayed data. This is not something that will be happening sometime in the distant future. Starting with the B2 Stealth Bomber, people working on the flight line will use a small hand-held device to help spot trouble, explain solutions, and display drawings.(6)

Who then will be CALS users? The standardization community - the procurement community - the military system design and development community - the maintenance community, in addition to the logistics community will all use and benefit from CALS. Prime contractors and subcontractors, as well as government organizations, will be included among the members of the CALS user community. CALS will affect more than just the U.S. DoD and its contractors. Since many of the standards being developed or adopted for CALS have or will become U.S. Federal Information Processing Standards (FIPS) they must also be used by other U.S. Government agencies. There is considerable talk of NATO adopting CALS, or a CALS-like requirement. This would probably result in NATO member nations following suit. So CALS appears to be a significant change agent.

CALS IMPLEMENTATION STRATEGY. CALS is being implemented in two phases. Phase I seeks to replace paper documents with electronic file exchanges based on universal standards. It also seeks to restructure the way technical databases are used. This should enable engineers, and others, to enter information once and have the data available to anyone using the system. Phase I is to be completed in the 1991-92 timeframe.

Phase II includes a complete redo of the computer and communications process to allow the shared database to be exploited using an advanced Standard Query Language (SQL). If it works, and if telecommunications and database security problems can be resolved, DoD and the contractors should be able to obtain all the engineering drawings and other weapons systems specifications from a single database starting in the early 1990s (FIGURE 2).

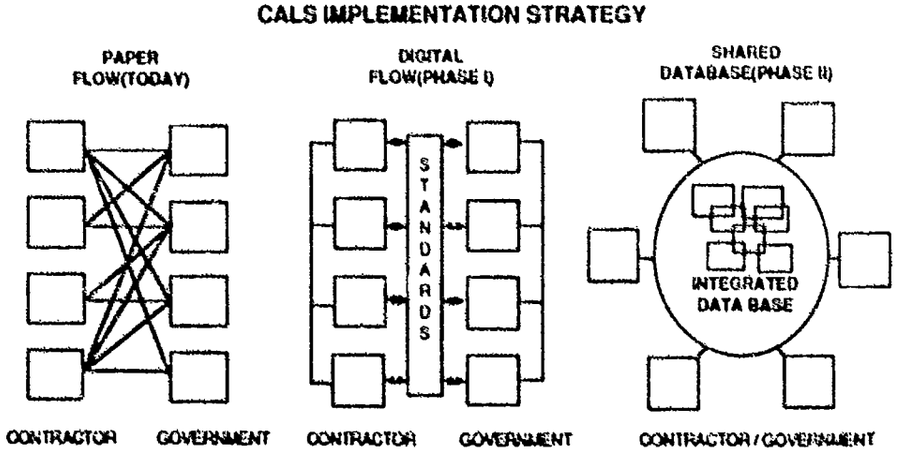

FIGURE 2

I believe the two most significant areas CALS is dealing with in its implementation are the development and implementation of standards and accelerating advances in technology, including methods to assure protection of unclassified but sensitive information.

The CALS implementation strategy includes:

1. The development and testing of standards for digital technical data interchange and integrated databases.

2. The sponsoring of technology development and demonstrations for the integration of technical data process and integration of reliability and maintainability with design.

3. The implementation of CALS standards in weapons systems contracts and incentives to encourage industry investment.

4. The implementation of CALS standards and integration requirements into DoD infrastructure, architecture planning, and modernization.

While CALS is accelerating the acceptance and work on several emerging text and graphical standards, including PDES (Product Data Exchange Specification) and the CCITT Group 4 raster image specifications, it is not waiting for a complete set of standards to mature. Phase I, for example, uses present and available standards with its focus on data interchange. A Military Standards Document, MIL-STD-1840A, sets the rules for organizing files into a document deliverable in digital form. It includes SGML (Standard Generalized Markup Language) for specifying the structure of text documents and IGES (Initial Graphics Exchange Standard), for drawings. To achieve the final goal, communications protocols, databases, and text, document illustration, and imagery structures are all being specified and standardized (FIGURE 3).(7)

CALS STANDARDS IMPLEMENTATION

STANDARD	TYPE	COMMENTS
MIL-M-28001 (SGML) Standard Generalized Markup Language & Output Specification	Text: documentstructure and format	Text is "marked-up" with tags that flag the logical structure of the document. The structure and set of tags are defined in a document type definition (DTD). MIL-M-28001 specifies the CALS DTD for technical manuals
MIL-M-28000 (IGES) Initial Graphics Exchange Standard	Engineering Drawings	Drawing is translated as a set of standard "objects" (such as lines, boxes, etc.) with associated engineering information. The receiving system can show the object from a chosen point of view.
MIL-M-28003 (CGM) Computer Graphics Metafile	Technical Illustrations	Unlike IGES, which contains dimensioning and other engineering data, CGM contains information soley about the illustration. CGM is a compact, relatively simple two dimensional graphics representation system.
MIL-M-28002 (CCITT/4) International Consultative Committee for Telegraphy and Telephony	Raster Images	Raster images, such as digitized photos and other graphics that can be stored as a series of lines (rasters) consisting of arrays of dots, as in FAX transmission.
MIL-M-28001 Tape	Transfer of CALS material to DoD	The umbrella standard for CALS. It contains specifications for tape output and also references the above CALS interchange formats.

Adapted from Interleaf MILSPEC UPDATE, Spring 1989, Interleaf, Inc., Cambridge, MA, USA

FIGURE 3

CALS is also helping accelerate the implementation of emerging information technology by sponsoring technology development and demonstrations for the integration of technical data processes and for the integration of reliability and maintainability considerations with design. To meet its ultimate Phase II objectives, CALS must fully exploit communications and computer capabilities (FIGURE 4), some of which are still not economically viable. For example, we can now "print on demand" information on computer terminals, but today's capability, particularly telecommunication capability, cannot economically (and probably not within the technical "state of the art" either) support high volume loads which include an intermix of text and graphics. If we add color and three dimensional representations, we far exceed present telecommunication capabilities. Fortunately, the tremendous benefits to both government and industry provide a myriad of opportunities for privately invested information technology initiatives in addition to those that are DoD-sponsored.

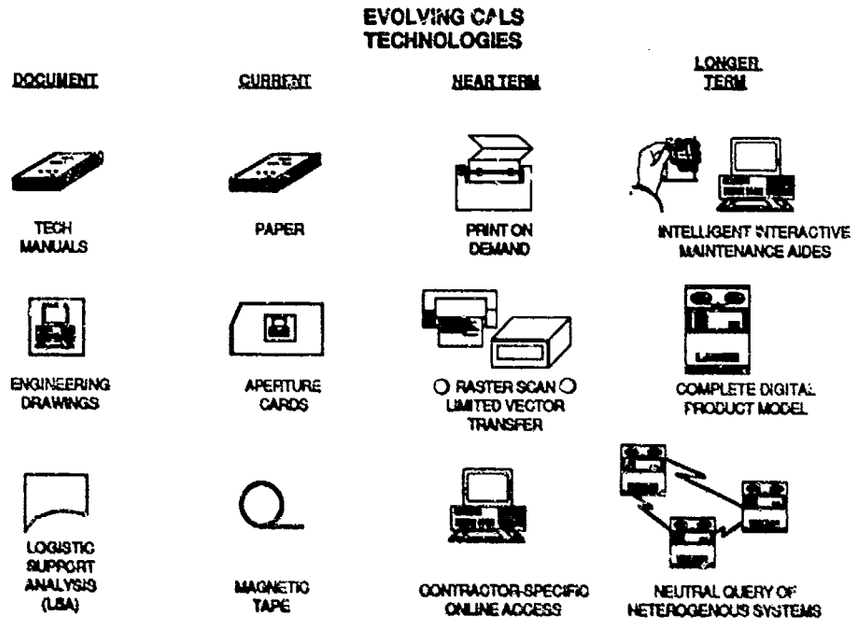

FIGURE 4

SUMMARY. This then is CALS, an effort of the U.S. Department of Defense to more efficiently manage the unbelievably large - and growing - amounts of technical data and information supporting every weapons system. Benefits, from an industry perspective, include productivity gains through automation and integration - by reducing the effort in the transition from design to manufacturing, by reducing redundancy in data preparation, and allowing near paperless data interchange between prime contractors and their subcontractors. With improved productivity will come improved quality of both product design and data. From DoD's perspective, these gains will shorten acquisition leadtimes, provide more timely, accurate and timely data, and reduce costs in both the acquisition and operation segments of a weapon systems life cycle.

CALS provides a unique opportunity to achieve major productivity and quality improvements through carefully planned and managed investment by both government and industry. Initially, the changes will be gradual, as building blocks are put in place and specific portions of the weapon system life cycle are enhanced. The standards portion of these building blocks will affect nearly every community which produces documents, not just those in the weapons systems development community .(8)

As the cumulative impact of CALS integration and infrastructure is realized, more far-reaching changes will occur in the way functions are accomplished, leading to better products, improved productivity, and reduced cost.

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TRANSFERT ELECTRONIQUE DE L'INFORMATION APPLICATIONS DANS LA SOCIÉTÉ "AEROSPATIALE"

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Résumé

Dans les grandes Entreprises le transfert électronique de l'information devient un des moyens stratégiques dans les prises de décisions au niveau des Directions Générales, des Bureaux d'Etudes et des équipes de Maintenance.

L'Aérospatiale développe et gère des Bases et Banques de Données internes "online" dans le domaine des informations économiques, techniques et sociales. La mise en application et l'utilisation des nouvelles technologies dans le domaine des réseaux de communication (RNIS : Réseau Numérique Ingégration de Service) génère de nouvelles possibilités dans le transfert des documents primaires (utilisation des DON - Disques Optiques Numériques -). Des études de faisabilité sont en cours et montreront si ces systèmes présentent un intérêt pour le groupe industriel Aerospatiale (coût/efficacité).

L'Aerospatiale étudie également les possibilités que présentent l'utilisation des CD-ROM. Plusieurs projets, dans le domaine de la terminologie et l'aide aux traducteurs, sera disponible à la fin de cette année. D'autres projets, développés par la Direction de l'Après-Vente de la Division Avions, portent sur la diffusion des manuels d'entretien, de maintenance d'avions et descriptifs de divers systèmes et sont en phase de qualification.

INTRODUCTION

Le thème du transfert électronique de l'information est un sujet qui préoccupe depuis fort longtemps le Groupe Aerospatiale à tous ses niveaux hiérarchiques de prises de décisions.

Le Groupe Aerospatiale est une grande Société aéronautique et spatiale française. Ses produits et ses études sont parfaitement connus. On peut citer pour mémoire Concorde, Airbus pour les avions, Gazelle, Dauphin pour les hélicoptères, Ariane, Hermès pour l'espace et certains engins et missiles dans le domaine de l'armement.

La Société comprend ~ 33 000 personnes (dont 75 % de Cadres et techniciens), son chiffre d'affaires est de 29 milliards de francs français dont 70 % à l'exportation. Ce dernier chiffre indique que pour exister et être présent sur les marchés mondiaux, nous devons être compétitifs et l'être de plus en plus. Etre compétitif cela implique que nous devons, par tous les moyens, baisser nos coûts de production. Hors pour baisser les coûts de production une seule solution possible, agir sur tous les éléments pris en compte dans le calcul des coûts de production.

L'information et la documentation se trouve être un des éléments pris en compte dans ce calcul. Il faut également signaler que dans toutes les Grandes sociétés l'information et la documentation commencent maintenant à être considérées comme un outil stratégique nécessaire à utiliser avant outes prises de décision; il faut donc absolument fournir la bonne information et au bon moment. Ce principe peut permettre dans certains cas d'éviter des erreurs d'appréciation sur tel et tel pays, ou tel et tel produit à lancer et par là même engendrer des dépenses importantes inutiles.

Le concept information/documentation cité dans cet exposé concerne l'information externe et interne à la Société. Il faut signaler que de plus en plus les ingénieurs des B.E. demandent à être informés dans un seul "bloc", non seulement sur ce qui se passe à l'extérieur de la Société, mais également à l'intérieur de sa Société. L'information demandée porte sur l'information technique générale (congrès, articles de revues, documents, ouvrages, etc ...) mais également sur la normalisation (interne/externe), les brevets (interne/externe) et le "savoir faire" de la Société.
De plus le concept documentation englobe également la documentation technique émise par les Directions des Après-Vente (manuel de maintenance, descriptif des systèmes, ...).

Ainsi donc, l'information/documentation étant l'un des éléments inclus dans les coûts de production, nous devons par tous les moyens diminuer son coût, la mettre à disposition des utilisateurs en évitant les intermédiaires qui alourdissent les temps de diffusion des documents primaires, c'est-à-dire la recherche manuelle des documents dans les archives, effectuer leur reproduction et l'expédition par la poste.

Nous développons et nous gérons des Banques de Données internes Société dans le domaine des informations économiques et techniques. Pour la normalisation, un système, depuis la saisie jusqu'à l'affichage des textes complets à l'écran, suite à une recherche bibliographique, est en cours d'étude et de réalisation et sera opérationnelle dans le courant de l'année prochaine.
Une étude semblable est menée pour la Propriété Industrielle et le recensement du "savoir faire" pour un de nos Etablissements considéré comme "site pilote". Il s'agit en fait du Centre Commun de Recherches Aérospatiale situé à Paris.

Par ailleurs, les Directions des Après-Ventes commencent à diffuser à titre expérimental des CD-ROM à leurs clients. Ces CD-ROM comportent les manuels d'entretien, de maintenance et descriptifs de divers systèmes équipant les avions et hélicoptères.

Dans le domaine de la terminologie et de l'aide aux traducteurs, l'Aerospatiale diffusera dans quelques mois un CD-ROM comportant une Banque de Données terminologiques associée à un logiciel d'aide à la traduction.

L'utilisation de la TAO (Traduction Assistée par Ordinateur) devrait également accélérer la connaissance et le transfert de l'information d'une part, par la supression des barrières linguistiques et d'autre part, par la fourniture directe aux demandeurs des textes à traduire.

Sans trop entrer dans les détails, voici les principales applications développées dans le domaine du transfert électronique de l'information dans la Société Aerospatiale.

BASE BIBLIOGRAPHIQUE DU DOMAINE TECHNIQUE

La base actuelle, tout à fait classique, permet d'accéder, après une recherche, à des références bibliographiques. L'utilisateur peut ensuite demander des prêts de documents à son Centre de documentation.

Une étude en cours, qui devrait déboucher sur un système opérationnel en 1990, doit permettre de définir la solution à adopter visant à fournir "en ligne" les documents demandés. Faut-il stocker sur disque optique numérique tous les documents signalés dans la Base? Faut-il les scanneriser et les archiver dans un Centre informatique? Sera-t-il possible d'utiliser les réseaux RNIS (Réseau Numérique à Intégration de Service)? Faut-il archiver sur des CD-ROM et diffuser ces disques dans les divers Centres de Documentation ? Faut-il scanneriser uniquement les documents demandés et les archiver ensuite sur un DON ou au Centre Informatique ? La solution retenue tiendra compte du montant de l'investissement à prévoir associé à la notion du "coût/efficacité" dont pourront bénéficier les utilisateurs.
Nous comptons également y inclure une sélection des pages de titre des notes internes de la Société.

BASE DE DONNEES MACRO-ECONOMIQUES

Dans le cadre général de l'information Société, une base de données macro-économiques sur les pays a été mise en place pour servir d'outil commun de référence. L'objectif principal est de répondre aux besoins des Directions Commerciales dans leur recherche des marchés internationaux.

Il est évident que pour répondre à ces besoins l'information doit être intégralement disponible en ligne dans tous les lieux de la Société et de nos coopérants.
A cet effet la Base est accessible soit par le réseau interne Société, soit par les réseaux de télécommunications via Transpac.

BASE DE DONNEES NORMALISATION

La Base actuelle permet d'accéder, après une recherche, à des références de normes (normes internes Société et externes). Par la suite l'utilisateur peut à partir d'une bibliothèque (sur support microfilms et microfiches) disponible dans tous les Etablissements de la Société obtenir les normes recherchées.

Une expérience est actuellement en cours afin de tester un nouveau système permettant d'accéder directement aux normes complètes (texte et figures). Le système fonctionne pour un nombre réduit de documents et utilise un logiciel de PAO IBM (DCF - Document Capacity Facility). La Base dans sa nouvelle version sera opérationnelle au cours de l'année 1990.
Cette solution reste ouverte à l'adjonction d'un système de traduction automatique qui permettra de réduire considérablement les coûts et les délais de diffusion des normes dans des langues différentes.
Si ce système s'avère souple, convivial et performant en utilisation courante, il pourrait également s'appliquer à la gestion du "savoir faire" de la Société avec l'archivage des documents correspondants.

BASE DE DONNEES TERMINOLOGIQUES MULTILINGUES

Cette base de données, à mise à jour permanente par des terminologues de la Société et des partenaires européens, permet de disposer en ligne dans plusieurs langues de toute la terminologie du domaine aéronautique et spatial. Elle présente l'avantage de pouvoir supprimer l'édition de dictionnaires sur support papier et permet à chaque rédacteur de notice ou à des traducteurs de gérer sa propre terminologie et par la suite d'enrichir la Base de données de la Société.

L'édition de cette Base sur CD-ROM, prévue en fin d'année, permettra de disposer d'une aide à la traduction et à certains traducteurs de corriger plus facilement et plus rapidement des textes traduits automatiquement par la machine. Ceci pourrait être par exemple le cas dans le domaine de la normalisation.

DOCUMENTATION TECHNIQUE EMISE PAR LES APRES-VENTES

La Direction Après-Ventes de la Division Avions a présenté au cours du dernier Salon Aéronautique du Bourget différents systèmes destinés à accélérer le transfert de l'information et à faciliter au sein des compagnies l'exploitation de leurs avions.

Ces divers systèmes permettent de gérer sur micro-informatique (avec des supports DON ou CD-ROM) toutes les informations techniques relatives à un appareil. Les nouvelles techniques utilisées permettront de supprimer le support papier et de gérer toute la documentation d'une manière automatique. Les compagnies pourront être reliées directement par informatique aux Bases de données de l'Aérospatiale et les réponses en ligne permettront de réduire considérablement les délais d'intervention et de livraison des pièces de rechange.

Parmi les différents systèmes mis au point on peut citer :

- **MIPS : Maintenance Information Planning System**

  Le système permet aux compagnies de gérer elles-mêmes l'entretien de leur flotte. Les principaux avantages sont les suivants :

  . Optimisation des opérations de maintenance et d'entretien;
  . Réduction du temps d'immobilisation au sol de l'avion;
  . Coordination avec les opérations annexes à l'entretien.

  Le système fonctionne sur mini-ordinateur (IBM 36, 38 - IBM AS 400 - HP 3000) et en début de l'année 1990 sur IBM PC/PS et compatibles.

- **CAATS : Computer Assisted Aircraft Trouble Shooting**

  Le système présente une liste de causes possibles à chaque étape de la recherche de panne. Il permet un gain de temps de dépannage, lève certaines ambiguïtés, permet à des non-spécialistes l'utilisation d'une méthode de dépannage.
  Le système fonctionne sur micro-ordinateur de type IBM PC ou compatible.

- **ADRES : Aircraft Documentation Retrieval System**

  Ce système permet de consulter la documentation sur écran (à partir d'un DON ou CD-ROM) et de sélectionner les informations (textes et images sur plus de 200 000 pages).
  Le système fonctionne sur des micros compatibles AT, configuration adaptable sous DOS, UNIX, Macintosh, etc ...

- **APEX : Advanced Project for European Information Exchange**

  Le système permettra aux compagnies de se connecter à une base documentaire du constructeur afin de consulter en temps réel la documentation technique de l'avion et obtenir en ligne une réponse à toute demande concernant la documentation de maintenance.
  Le système est actuellement en cours de développement sur programme "pilote" avec un client "pilote" et devrait être opérationnel au cours du 3ème trimestre 1990.

- **OPAL : Order Processing Automated Online**

  Le système permet à une compagnie de se connecter sur l'ordinateur central d'Aerospatiale pour gérer l'ensemble de ses demandes et achats de pièces de rechange.
  Le système permet également de suivre l'état de ses approvisionnements, de ses stocks et de ses magasins.
  Pour se connecter au système l'utilisateur a le choix entre 2 solutions: Soit un écran IBM type 3276 ou IBM PC avec carte de télécommunication intégrée, soit avec une imprimante comportant un ou plusieurs écrans compatibles IBM;

En ce qui concerne la Division Hélicoptères, on peut citer le système SADA (Système Automatisé de Documentation Aérospatiale). Ce système gère la documentation de 350 clients (1000 manuels personnalisés) répartis dans le monde entier.
L'information est diffusée sur des DON et consultable sur des réseaux Ethernet.

CONCLUSIONS

Ainsi, les applications énumérées ci-avant montrent les efforts entrepris par l'Aerospatiale visant à profiter pleinement des nouvelles technologies qui nous permettront de diminuer les délais de transmission de la documentation et de l'information dont nous avons besoin (pour nos études de marchés et les B.E.) et de répondre en temps réel aux questions posées par nos clients.

La messagerie électronique n'a pas été mentionnée, mais ceci n'est pas un oubli. En ce qui nous concerne cette application n'a pas rencontré le succès attendu. Par contre on assiste à une très forte croissance de l'utilisation du téléfax, jugé beaucoup plus convivial que la messagerie électronique.
Dans la mesure où un système de traduction automatique performant sera disponible sur le marché on pourra noter l'importance que prendra la traduction automatique dans le transfert électronique de l'information.

INFORMATION TECHNOLOGY APPLICATIONS: A BRITISH AEROSPACE MILITARY AIRCRAFT LTD VIEW

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1. SUMMARY

A view of the use and impact of Information Technology in BAe Military Aircraft Ltd is presented. A precis of the current and expected business market place is included to give perspective to the importance of this industrial sector. The current situation is described with reference to typical conflicting requirements and the dynamic, competitive background. An example of a high level integrated Business Architecture is included which comprises a basic element of information flow in a company. Many of the components of an I.T. system focus in the Project Management activity, and consequently a system used for the Management of Projects is described in more detail. This illustrates in more depth the nature and complexity of one of the main activities in Aerospace, and gives in addition an indication of the investment and timescales involved in such large-scale projects. Some conclusions are presented for consideration as policy guidelines for adoption by the AGARD panel.

2. GENERAL BACKGROUND AND INTRODUCTION

The British Aerospace industry has a very good reputation in applying high technology and innovation to products which have to compete in a world-wide market place. Many of these products are dependant upon collaborative arrangements in which the team members are separated geographically, have different skills and experience and different cultural backgrounds.

Britain's share of the aerospace market is about 15%, corresponding to an annual turnover of about £8 billion in 1986. A view over the next two decades suggests that the military content of the world aerospace market will be about 33%, of which the largest element is Combat Systems and aircraft. The current key technology driver of the military market and hence the aerospace scene, is the fighter. This is expected to be augmented by the increasing emphasis on space over the next 20 years.

Currently, the British Aerospace industry employs some 200,000 people deployed in 3 major contractors with airframe or total systems capability, 9 engine and major systems companies and about 300 equipment suppliers. A further 2,000 aircraft related suppliers and a total of about 15,000 companies of all kinds completes the UK industrial structure.

The BAe Group of Companies employed 131,000 people at the end of 1988, of which 57,600 were concerned with Defence Systems. Military Aircraft sales in 1988 amounted to £1,659 million.

It will be appreciated that the quality of management and the information needed in the management and engineering processes must be of the highest order to ensure profitable survival in the extremely complex, high quality and commercially demanding market place. Three essential principles have guided the British Aerospace industry in pursuing this aim:

- a capability to design, develop, make and market complete vehicles and systems must be maintained.

- a technical competitive edge must be sustained.

- There must be continuing effort to reduce unit costs.

Information Technology is a fundamental core of these three principles and can be used to make significant improvements to the performance of our business. The following sections of this paper illustrate an approach being used in British Aerospace Military Aircraft Ltd, which leads to an example of a particular application in the key field of the Management of Projects.

3. BAe MAL APPROACH AND CURRENT SITUATION

It was recognised in the early 1980's that a long-term view of our business and its dependencies upon electronic data processing, communications, information and the related systems was needed.

Two main features emerged:

- a considerable investment in computer-based technology, training, support etc, must be expected as a way of easing communications problems associated with many dispersed sites and collaborating companies, and as a means of cost effective added value improvements.

- solutions should remain valid irrespective of changing business opportunities and organisation.

Considerable assets already existed in the Company, of course, and whenever possible, such assets would form the basis of future systems and standards.

A continuing awareness started to surface; those organisations having information will make money from it or through it; those organisations without the information will have to pay to acquire it.

There are two consequences to this which were considered important:

- information (and possibly the information system) is a marketable commodity.

- a company's success in the future will be linked closely to its success in the exploitation of information technology and in particular to the data.

The survey mentioned above provided confirmation that what are now recognised as typical IT opportunities were relevant to our business. Such opportunities include:

- improved productivity
- better competitive edge
- reduced timescales
- closer collaboration
- more streamlined management
- better commonality of standards across sites
- more operational flexibility
- constructive change of workforce skill levels
- reductions in IT costs will create further opportunities.

Limitations and trends in the current technology were recognised also, and included:

- Difficulty of choosing a stable and mature IT supplier(s) against a background where strong competition and changing industry alliances occur.

- The need for increased communications network capabilities in the 1990's and beyond. Such features as Local area network to wide area network gateways, fibre optic standards such as Fibre Distributed Data Interface are expected to form the basis.

- The need for more open standards, for example Open System Interconnection bridged to Systems Network Architecture.

- Integrated service digital networks will enable speech, data and image to be carried on the same lines and exchanges, but are not yet available widely.

- Computing power increases will continue, enabling more use of relational data base software, structured query languages, computer drafting and improved graphical outputs to become commonplace.

- The limits in the use of artificial intelligence and knowledge based systems will continue to be eased.

In addition to these technological boundaries, it must be appreciated that a rather delicate synergy with Customer influences frequently has to be achieved and this may limit our ability to be self-determining.

The culmination of the approach and work outlined above led to a suite of conceptual office and business systems which were considered key to British Aerospace's operations in the future. Concentrating on the latter in this paper, these systems were related in a structured methodology at various levels to an Overall Business Architecture (fig. 16-1).

This was defined first in 1985, since when progress has been made in providing system definitions and solutions on a broad front. There have been company reorganisations and other external factors emerging (e.g. Computer Aided Acquisition and Logistics Support) during the last 4 years, but the basic concept has not changed fundamentally. It will be appreciated that the systems contained in the architecture are of considerable size and complexity; consequently it is to be expected that progress on these systems has not been uniform.

Nevertheless, some implementation and productive use is now accomplished and the next two sections of this paper will describe one of the key systems in the Overall Business Architecture, and give some examples of its use. This system is called PROMIS - PROject Management Integrated System.

4. THE MANAGEMENT OF PROJECTS - A Systems Example

Fig. 16.2 illustrates simplistically the major factors upon which the successful management of any project depends. Naturally, these factors assume different degrees of importance against different business scenarios and also as the life cycle of a particular project develops. The Military Aircraft scene typically contains relatively high risk (commercial and technological), has several end users (but not necessarily customers), several major collaborators and a life cycle of several decades. Each of the factors in fig. 16.2 requires the existence and use of sub-systems and standards to ensure control and predictability of the product to ensure in turn a profitable contribution to the business of the Company.

Additionally, there are two fundamental requirements of the overall management system:

- active management control and feedback capability
- the ability to produce credible executive management reports.

Compiling all such requirements leads to the essential strategic objectives of an integrated system to manage projects. Similar work results in the compilation of the data flows and information content of the data bases and consolidation of all objectives with the detailed requirements leads to a specification against which a solution can be designed.

At this stage, it may be helpful to review some of the major conflicts in system attributes and to make decisions as early as possible in the system life cycle upon those attributes critical to its success. Some of these attributes are illustrated in fig. 16-3. The following policy decisions were taken early in the definition stage of the system:

- the system should contain macros, algorithms and standard arithmetic such that many users would present uniform results to higher management.

- users must be discouraged from becoming 'experts' in the system or its language, but encouraged to use the system as a tool for managing projects.

Much of the above will be recognisable generally in the life cycle of many systems. Turning our attention to the specific system for the management of projects, concurrent with the BAe initiatives described in section 2 of this paper, the European Fighter Aircraft project (EFA) was gathering momentum and an early requirement was that the Project Management must be aided by automation. It has been our experience that to succeed with a system implementation, a 'lead project' is necessary.

EFA PROVIDED THAT LEAD PROJECT.

Over the last few years, the EFA project has gelled and has now entered the contractual development phase. A simplified view of its management information flow is shown in fig. 16-4 which also demonstrates the distributed nature of the data in the system. Fig. 16-5 shows the augmentation of the management data by a simplified operational information flow. By the progressive identification of the detailed requirements, business system designs, code and controlled implementation we have now arrived at an automated, integrated tool usable to aid many of the project management requisites - PROMIS.

Currently its features can be summarised as illustrated in fig. 16-6.

The entry of data to manage the project, in a menu-driven fashion, leads to the output of a suite of tabulations and graphs produced from embedded processes. The data can be based upon a simple barchart, but full system benefits can only be derived by the use of critical path network techniques. The precedence method has been adopted as the PROMIS standard.

It is noteworthy however, that barchart output from the network - based analysis is the basic presentation requirement for timescale information.

The system is coded in the Metier Management Systems Artemis language and runs in an IBM mainframe environment. A development is underway to provide linked local work stations on PC's. Automatic data transfer with other systems is in varying stages of maturity and other Military Aircraft Limited projects (in addition to EFA) are using the system (as are some Civil projects).

It will be appreciated that the use and disciplines of such a system have had considerable impact upon the company culture and have required investments commensurate with our early expectations.

The return on this investment is now beginning to materialise, as the system use spreads beyond the lead EFA implementation project.

5. THE MANAGEMENT OF PROJECTS - SOME PRACTICAL EXAMPLES

The main features of PROMIS are illustrated in this section by means of examples drawn from data used in the pre-release testing of PROMIS. These data are network based, relate to several projects and are deliberately restricted so that manual checks can be performed to validate the automatic processing carried out by the system. It should be noted that by linking multiple networks within a structured frame work, no theoretical limit to the overall size is present. A hierarchical approach is considered mandatory to ensure that the relevant information is available for entry and output purposes at different levels in the organisation. The key to such a hierarchy is the Work Breakdown Structure, complemented by the organisational breakdown of the company in performing the various tasks.

These two elements (WBS and OBS) form key information sources in the Work Authorisation document (called a Directive in BAe MAL) and a typical example, for a different project, is shown in fig. 16-7. The full document contains additional information upon budget, activity timescales, tasks to be performed, reporting requirements etc. Management is facilitated by using the same identifying code to collect expenditure of manhours and money as that which authorises the work.

The essential steps in using the PROMIS system are illustrated in fig. 16-8. In setting up the project inicially, data entry of planning timescales etc. is carried out manually. Automatic transfer of budgets, expenditure etc. is being performed currently for certain projects and will become the routine update method.

Most of the steps are menu-driven (the remainder are assigned to function keys) and a small section of the menu is shown in fig. 16-9. The full menu suite contains currently approximately 250 line items. Screens are colour coded for mandatory and optional data fields and the frequent user can make use of the menu-jump facilities to avoid stepping through this extensive menu structure.

A comprehensive security and permission feature is built in and this augments the host computer's security facilities. Data and process validations are provided additionally.

Having completed the basic data entry steps, a critical path analysis is run and output can be presented in a variety of ways. Activities can be scheduled against different work patterns and calendars - a useful feature in the multi-collaborator projects scenario. A small section of a network plot and barchart output are shown in figs. 16-10 and 16-11, a spend achievement chart is shown in fig. 16-12 and a resource histogram in fig. 16-13. Space restricts the inclusion of further examples; many other presentations of the information from the master data base are possible by making use of the different selection criteria and report and graphics generators built into the system.

A most useful feature of the PROMIS system is the ability to predict out-turn of a project and impact on expected milestones and end dates. This feature assumes more significance in the modelling role ('what-if?'), during which a copy of the master data is used and modified to analyse a particular set of circumstances (sudden reduction of resources, change of work content, contingency or recovery actions necessary should an activity or milestone change, for example). The results of this 'what-if' model can be presented with the same features as the basic master data, thus enabling management comparison to be carried out.

The examples described above represent a small proportion of the capabilities of the PROMIS system, but illustrate the features most basic to the migration into a fuller IT aided management of projects arena. The introduction of such a comprehensive system represents something of a culture shock to an organisation and advanced training courses, documentation and help facilities are all part of the costs of adopting such an aid to management. The benefits derived are numerous and can be summed up in the greater visibility and multi-functional collaboration aspects of the conduct of the work and the improved efficiency and competitive edge to the company's business.

6. CONCLUDING REMARKS

A view of a particular application of Information Technology has been presented with respect to the management of projects in BAe MAL. The system derivation and examples of the data have been provided and the importance of automated business systems to British Aerospace has been stressed. The majority of the content of this paper can be summarised in the three basic relationships shown in fig. 16-14.

It can be seen that the system described, (PROMIS), contributes in two of the three basic driving forces to the Value Added by the Company. Since this Value Added must be sufficient to produce a reasonable profit margin, the significance of such systems is self-evident.

Turning to more general messages, the following are thought to be of importance:

- a realistic and objective strategy must be produced before embarking upon an IT application.

- inter-organisational systems will increase in importance and will place greater demands upon the communications and standards required to allow satisfactory operation.

- we already have too much information in an unstructured form. The rejection and organisation of the information into relevant parcels is the key factor in a successful IT system.

- the principal sponsor of the system must be the user.

All of the above topics covered in this paper can be paraphrased into a digestible illustration - the Information Volcano fig. 16-15. In a stable, controlled environment, we produce end items (say Military Aircraft) management reports, hopefully profit, etc.

Out of Control - all goes up in smoke and lava!

7. REFERENCES

Much of the content of this paper has been condensed from British Aerospace proprietary material. The following additional sources are referenced.

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Aerospace - April 1988
Author - Mr I R Yates

(2) Harvard Business Review - various.

(3) CALS - presentation in London, 24 March 1988, given by Admiral R G Freeman III, USN, (retired).

(4) British Aerospace - report to employees for 1988.

8. ILLUSTRATIONS

9. ACKNOWLEDGEMENTS

It will be very obvious that many people inside BAe and in other companies have contributed in many ways to this paper. The author wishes to express his thanks to them all.

OVERALL BUSINESS ACTIVITY FRAMEWORK

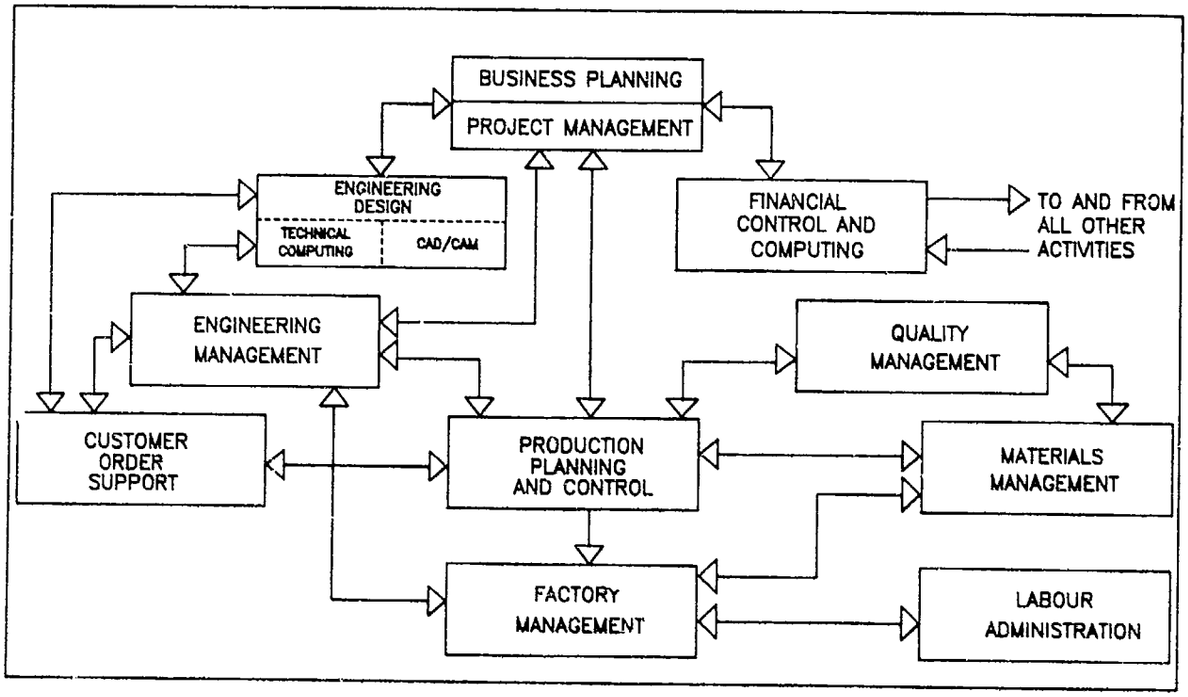
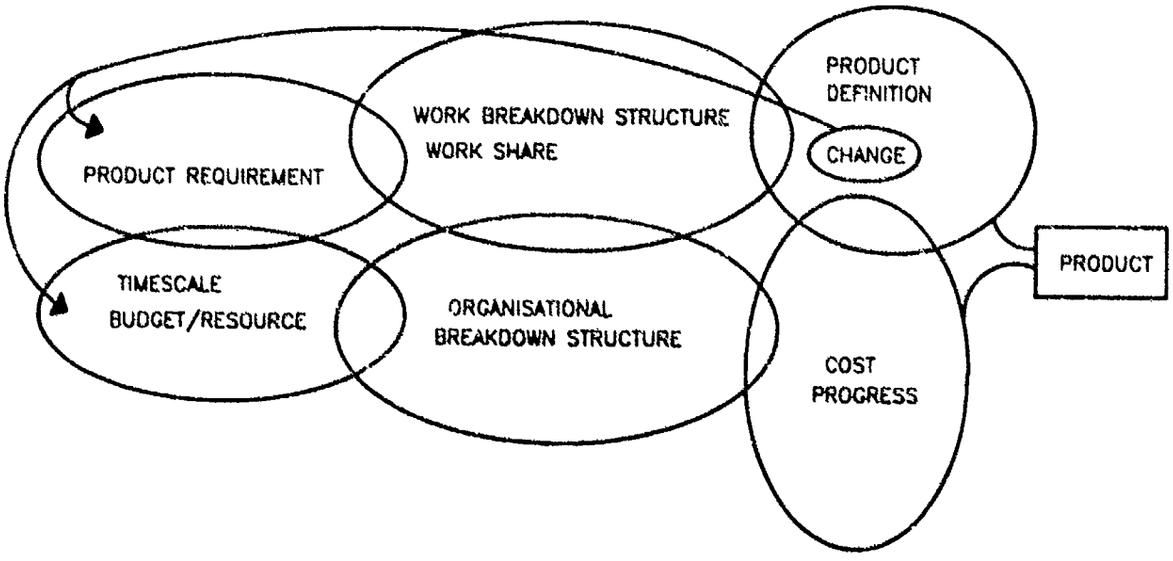
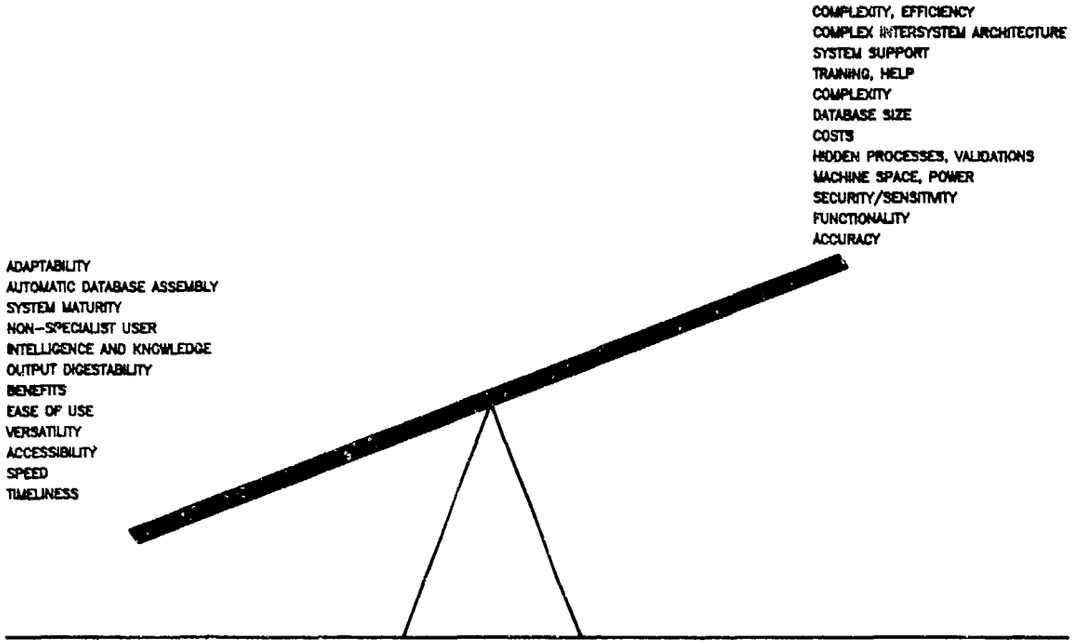


Figure 16.1



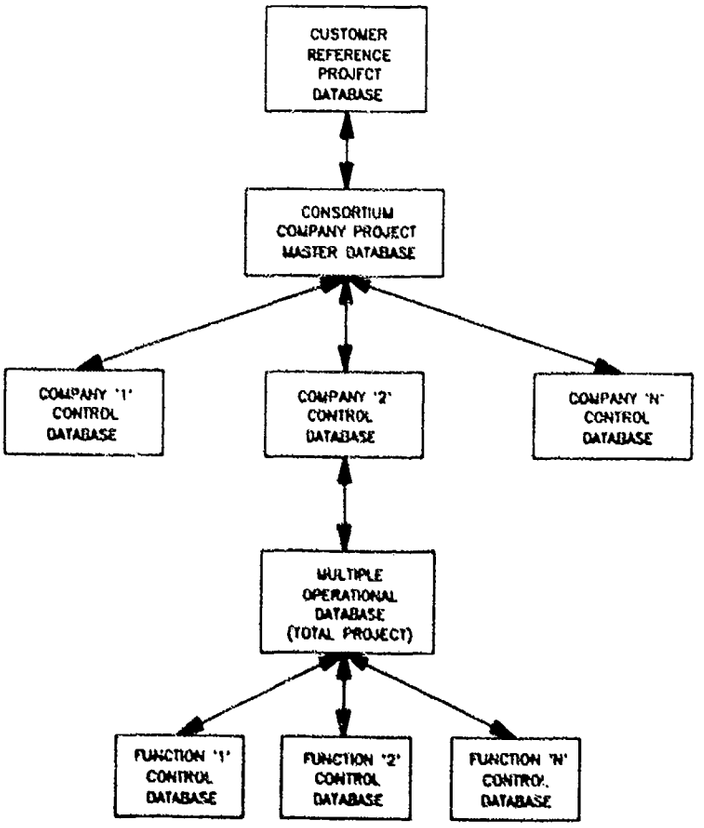
SIMPLE VIEW OF THE MAJOR FACTORS IN THE MANAGEMENT OF PROJECTS

Figure 16.2



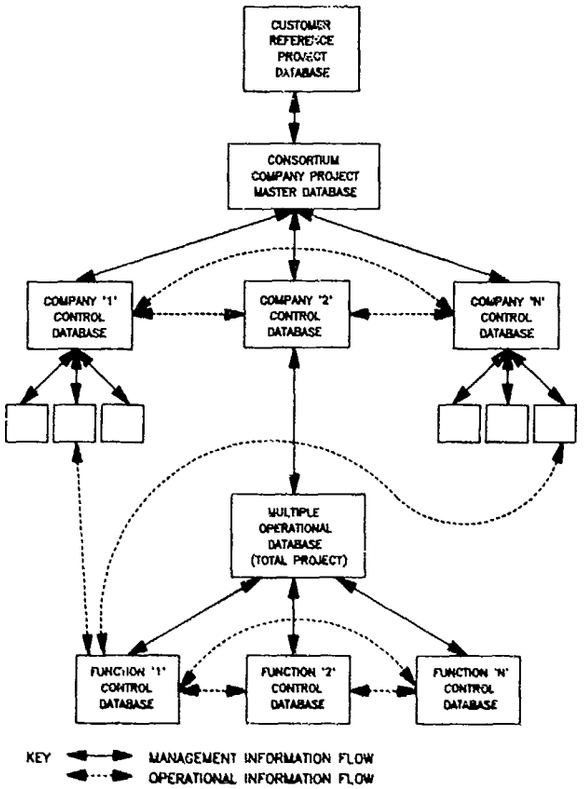
THE SYSTEM ATTRIBUTE CONFLICT

Figure 16.3



SIMPLIFIED PROJECT MANAGEMENT INFORMATION FLOW

Figure 16.4



SIMPLIFIED OPERATIONAL AND MANAGEMENT INFORMATION FLOW

Figure 16.5

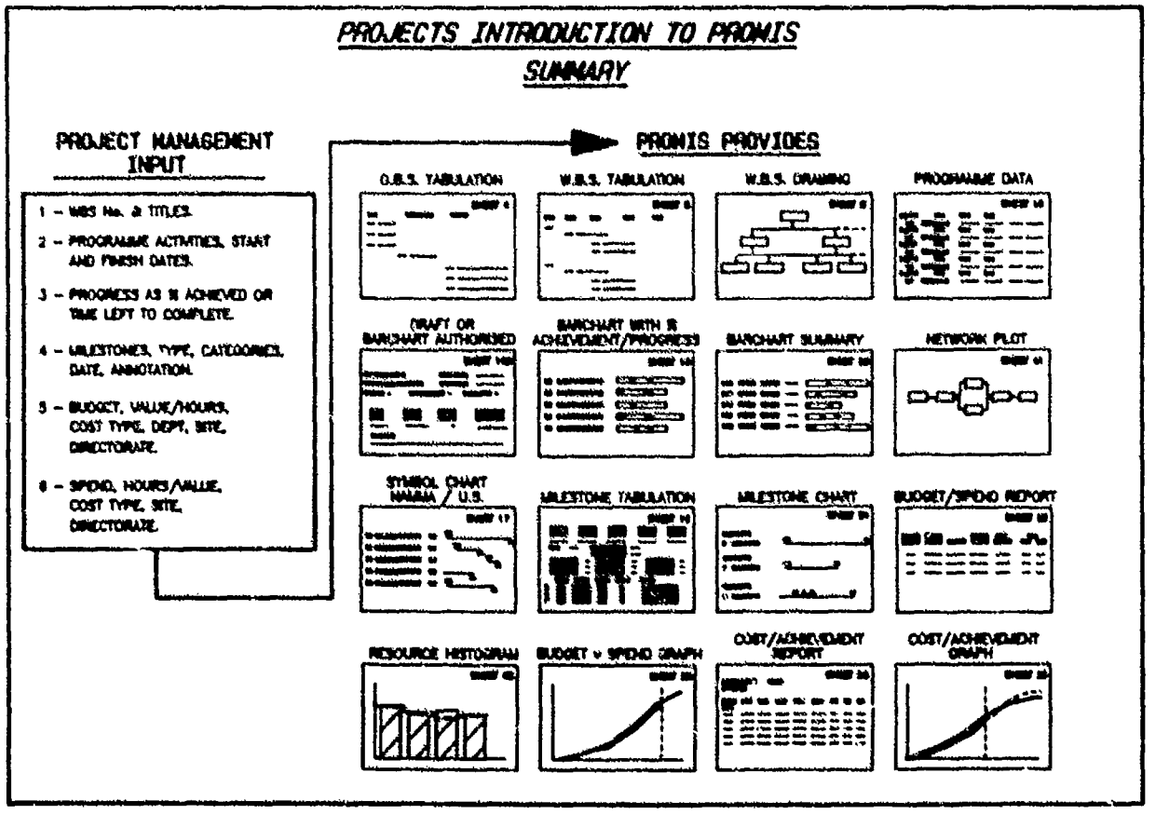


Figure 16.6

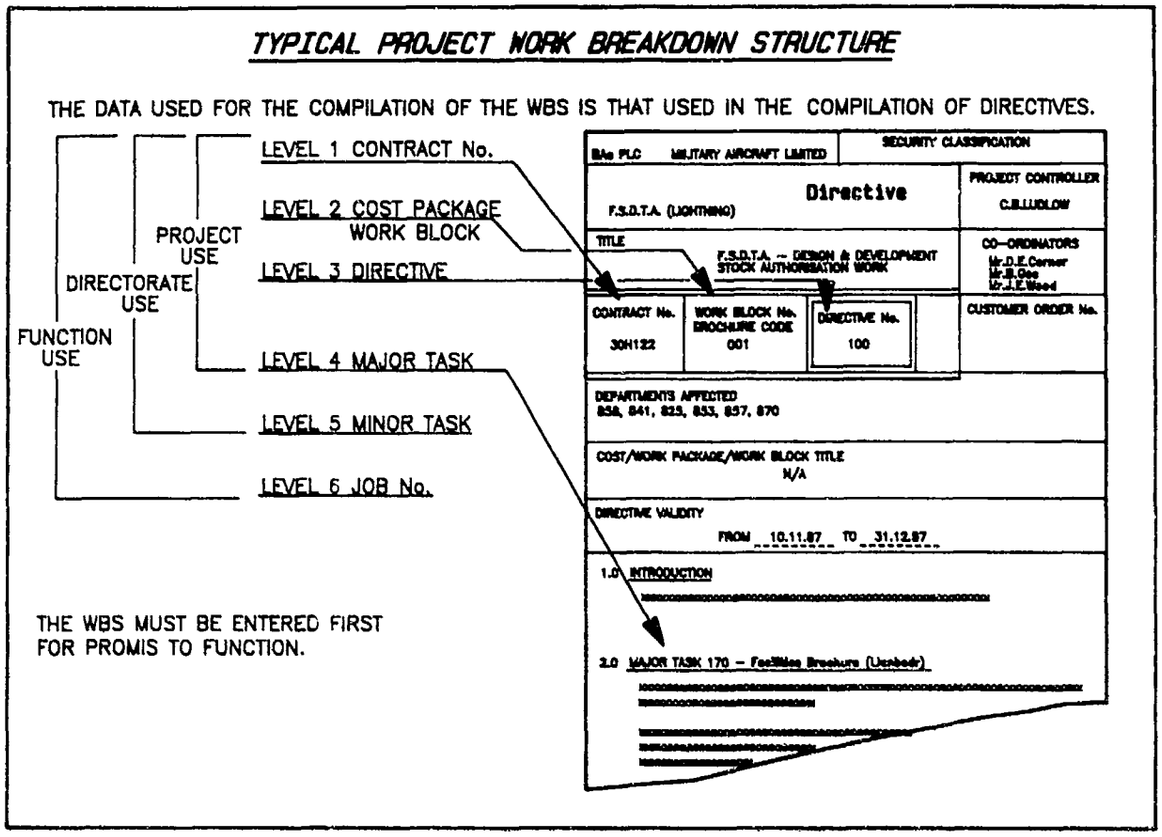


Figure 16.7

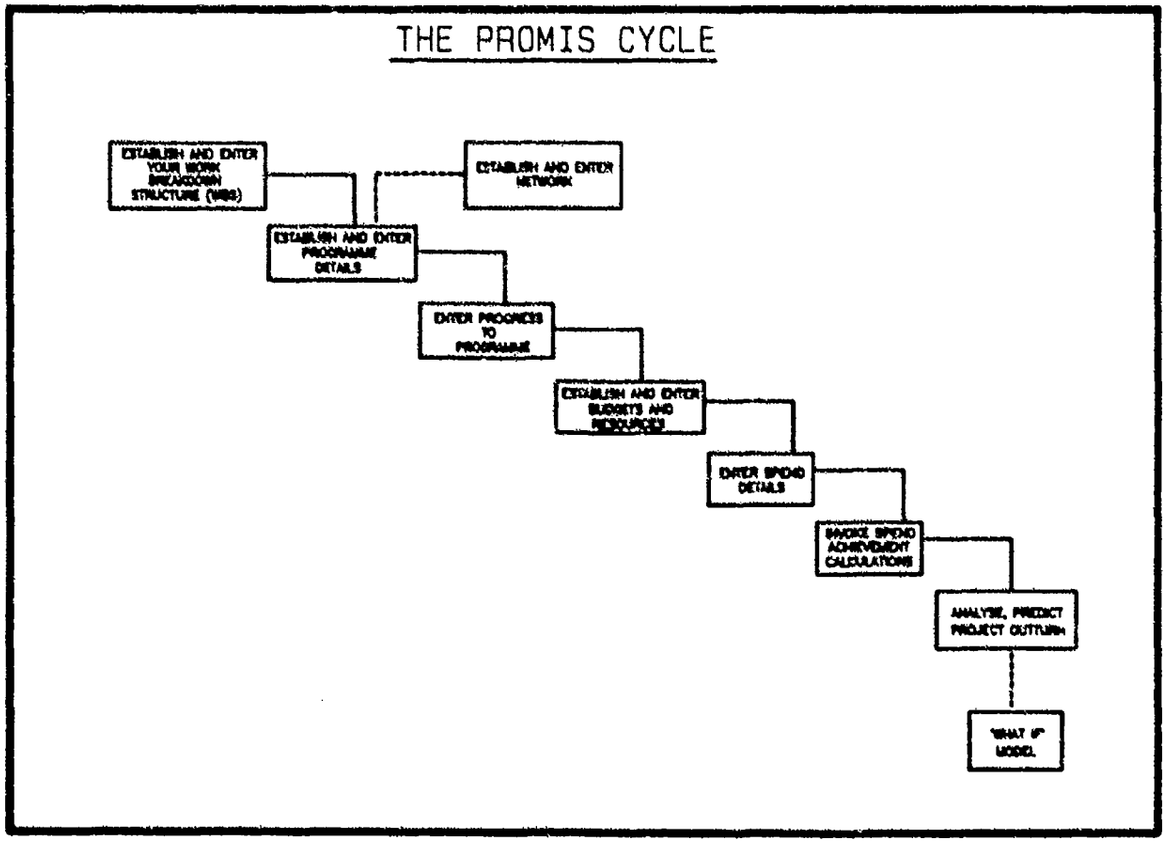


Figure 16.3

PROMIS MENU STRUCTURE

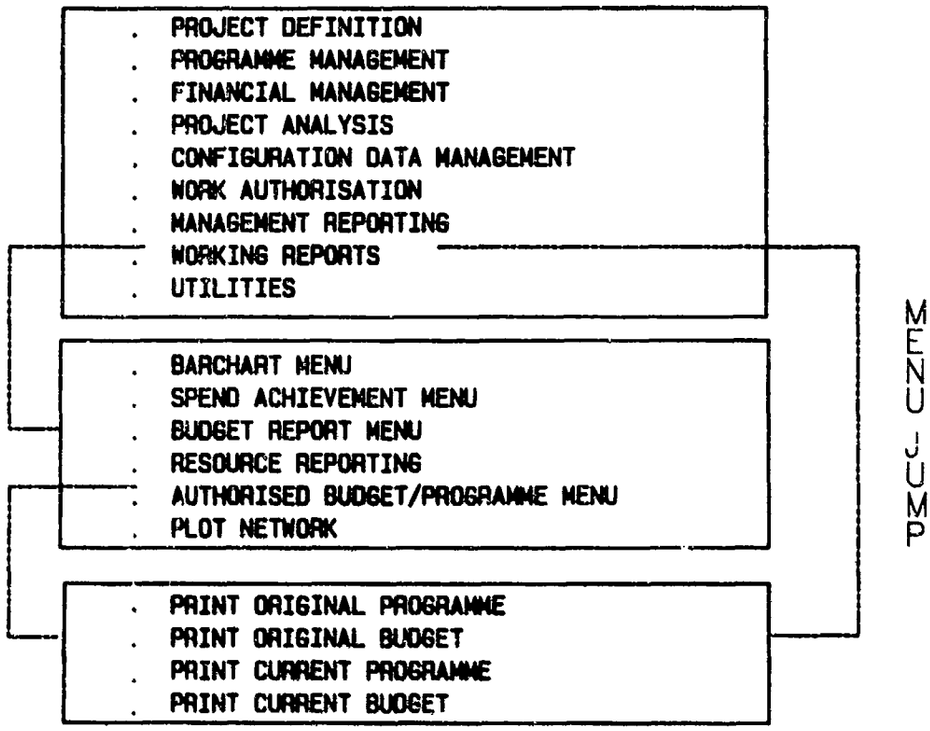


Figure 16.9

NETWORK PLOT

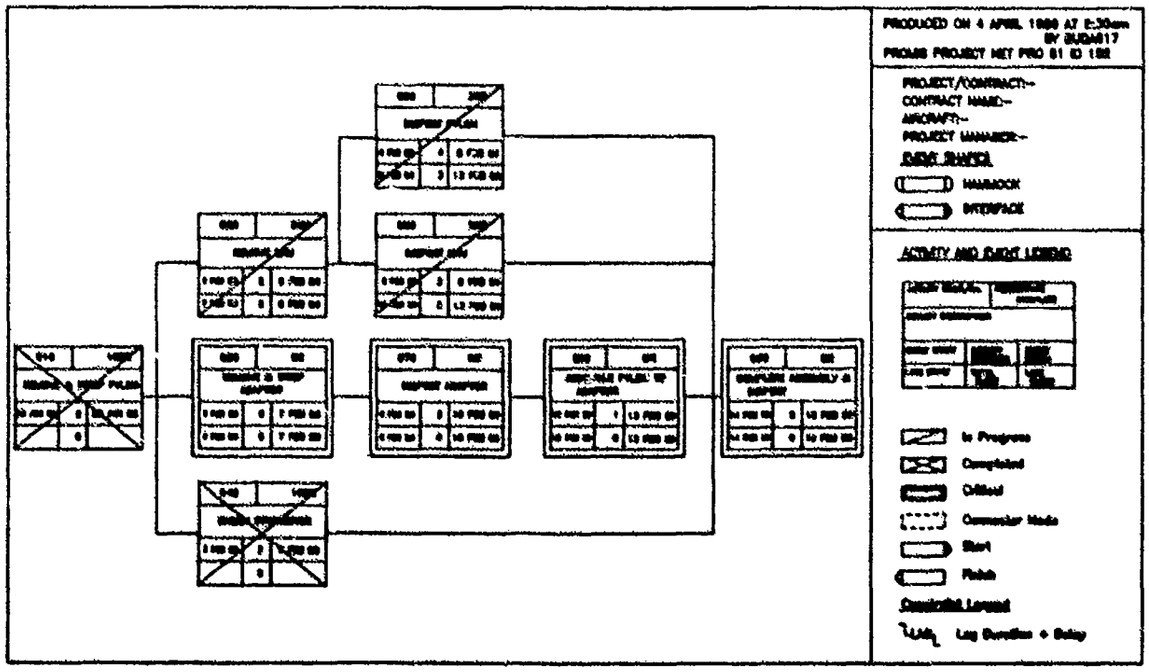


Figure 16.10

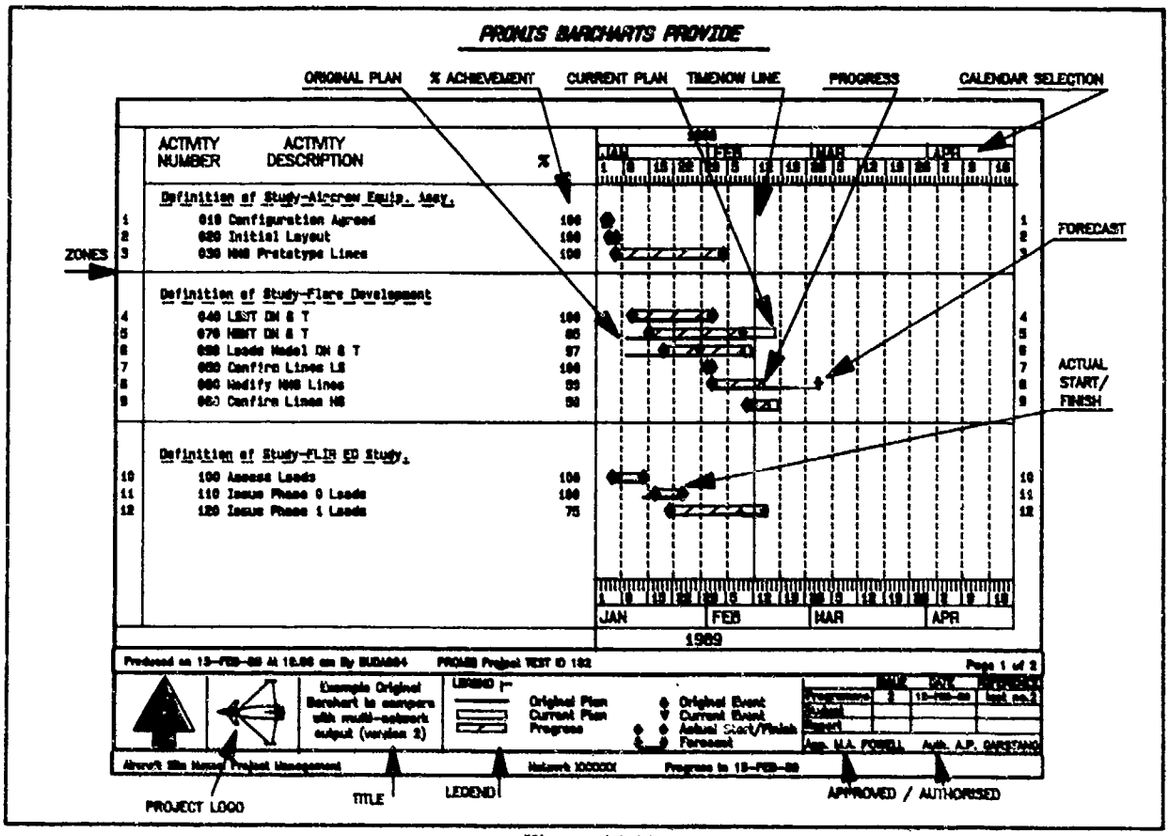


Figure 16.11

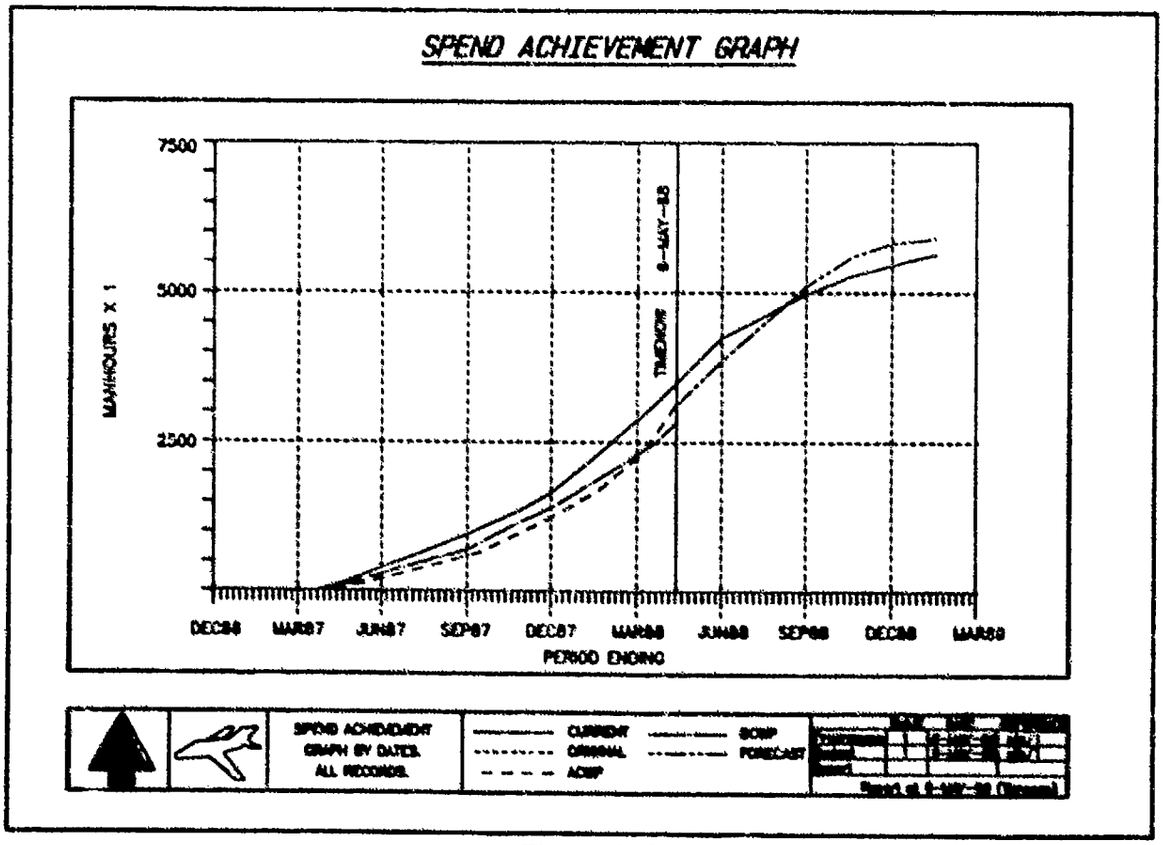


Figure 16.12

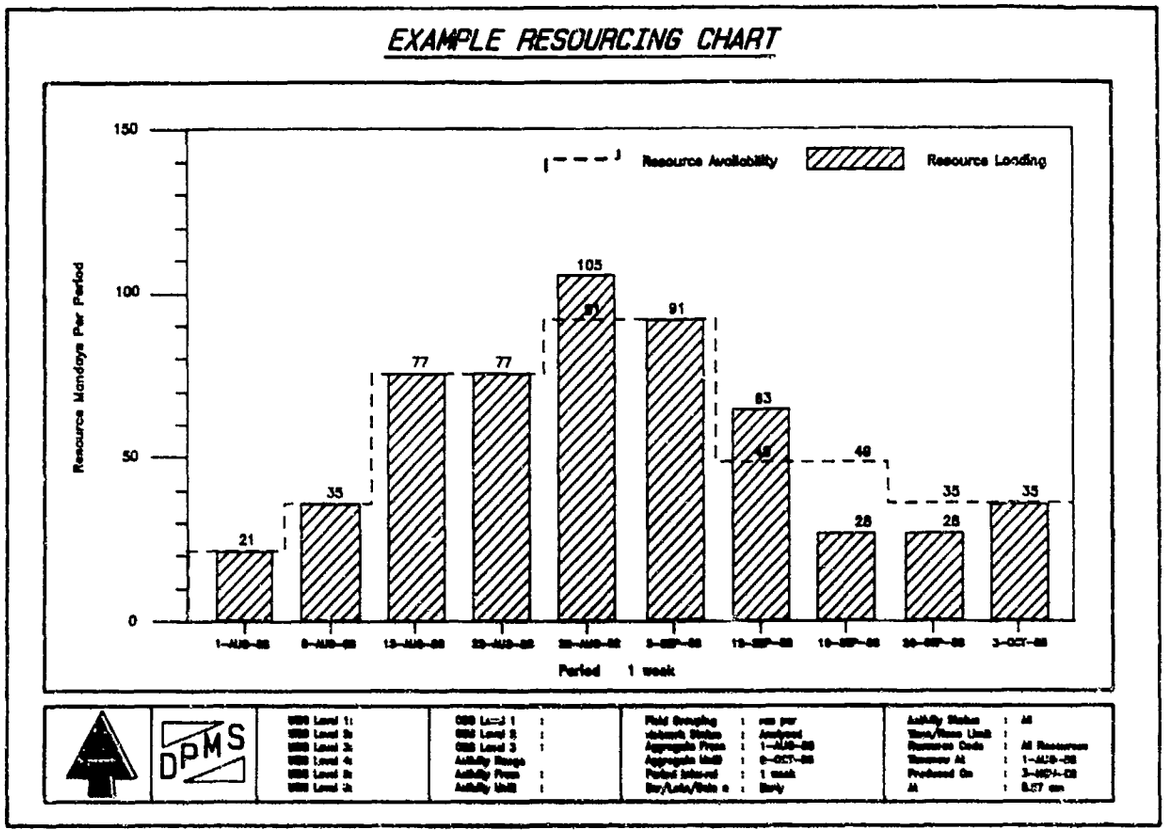


Figure 16.13

THREE BASIC RELATIONSHIPS

1. PLANNING $\sim \left(\frac{1}{\text{DISORDER}}\right)$

2. SUCCESS $\sim \left[\left(\frac{1}{\text{DISORDER}}\right) \times \left(\text{PERFORMANCE}\right)\right]$

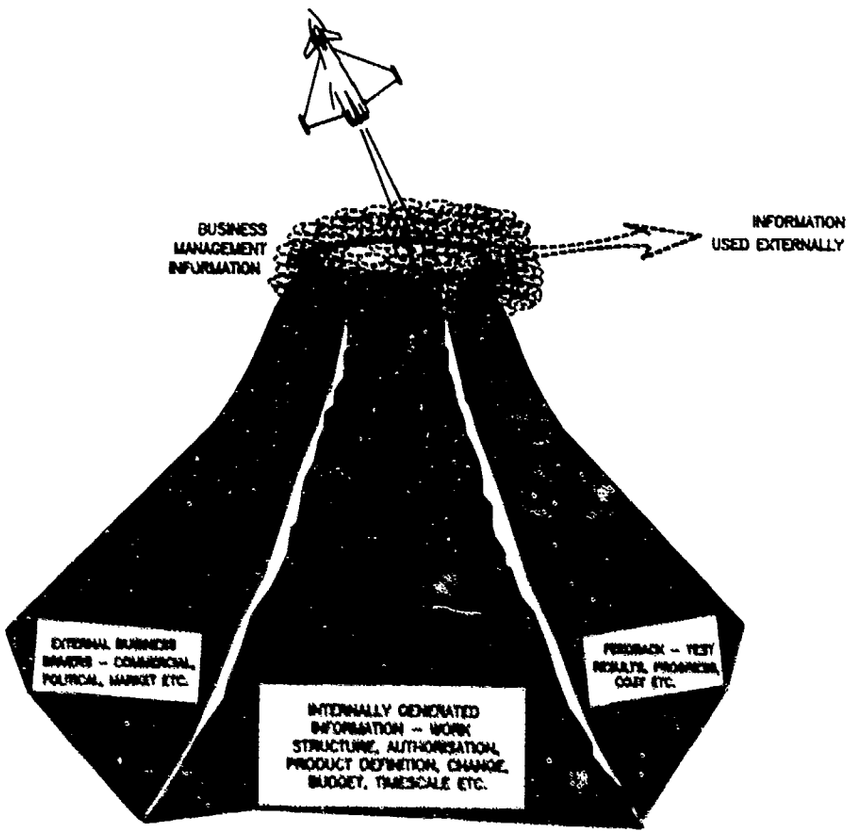
3. $\left[\left(\text{SELLING PRICE}\right) - \left(\text{BUYING PRICE}\right)\right] \sim \left[\left(\frac{1}{\text{DISORDER}}\right) \times \left(\text{PERFORMANCE}\right) \times \left(\text{QUALITY}\right)\right]$

KEY

——— PROMIS CONTRIBUTION

——— CONTRIBUTION FROM ELSEWHERE

Figure 16.14



THE INFORMATION VOLCANO

Figure 16.15

PERCEPTION AND PERFORMANCE PROTOTYPER

by

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INTRODUCTION

Dr Boff is one of the Editors of the 'Engineering Data Compendium', a 3-volume Manual on Human Perception and Performance that was published in 1988 by the Harry G. Armstrong Aerospace Research Laboratory and of which AGARD was one of the sponsors.

Dr Boff gave a short presentation to the meeting of his plans for a CD-ROM based engineering database and demonstrated a simulated system to participants. Since this proposed database is very relevant to the topic of the meeting, both in subject matter and the medium to be used, this summary, which was prepared by Dr Boff, has been included in the Proceedings.

PERCEPTION & PERFORMANCE PROTOTYPER:

A HUMAN FACTORS INFORMATION RESOURCE FOR DESIGN ENGINEERS

This document announces the intention to develop the PERCEPTION & PERFORMANCE PROTOTYPER, an Apple Macintosh based multi-document engineering database on CD-ROM. The P^2 PROTOTYPER currently is in conceptual design and we expect that 18 months will be required to complete the design and develop the software. The documents to be included in the database will be the *Engineering Data Compendium* and *MIL-STD-1472-D* [1,2]. The product will allow users to electronically access the complete text and graphics of these two human performance information sources in an effort to integrate that information with their engineering design efforts.

Our extensive research [3,4,5,6,7] into engineering design has lead to a unique product concept aimed at engineering practitioners, behavioral researchers, and educators. This product will present two major advances over current electronic information sources. One advance will be an on-line system for experiencing and exploring human performance phenomena discussed in the two documents. The other advance is the implementation of our internally developed methods [8,9,10,11] for advanced information retrieval capabilities such as hypertext linking and text searching to promote easy access to the information contained in the documents.

Engineering Data Compendium

The *Engineering Data Compendium* is a three-volume scientific and engineering source containing comprehensive reference information on human perception and performance. The *Compendium* provides principles and data defining the capabilities and limitations of the human operator. Target users are the designers of interfaces for complex systems such as aircraft cockpits. The goal of the *Compendium*'s use is to achieve a match between system specification and operator characteristics.

The *Engineering Data Compendium* is a specialized document containing nearly 2700 pages of technical information organized into 1100 individual entries. The *Compendium* also includes over 2000 figures, tables, and illustrations to aid users in understanding and evaluating the information in each data entry.

MIL-STD-1472-D

MIL-STD-1472-D is a Military standard for *Human Engineering Design Criteria for Military Systems, Equipment and Facilities*. This standard is used to present human engineering design criteria, principles, and practices. The information contained in this standard is used to ensure human system integration and is used to enhance system effectiveness, simplicity, efficiency, reliability, safety, training, and maintenance.

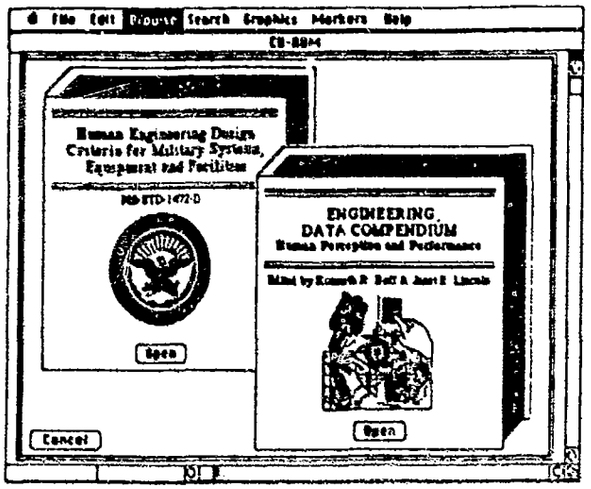
MIL-STD-1472-D is a 300-page document. It is organized into six major sections and 15 sub-sections. This standard includes over 50 figures and nearly 30 tables that correspond to information presented in individual paragraphs of the document.

Information Structure

Within the *Engineering Data Compendium* and *MIL-STD-1472-D*, information is presented in a variety of forms that include the following:

- ***Sets of quantitative data*** such as visual sensitivity under various illumination conditions and anthropometric measures of specific population samples.
- ***Comparative quantitative data*** for conducting trade-off analyses such as relative accuracy in reading alternative types of visual instruments.
- ***Principles*** based on substantial experience and research provide guidelines for design.
- ***Mathematical functions*** that relate human performance to environmental, system or physiological conditions.
- ***Graphical representations*** such as nomographs relating human performance to operational or physiological conditions and used to select design parameters.
- ***Design criteria*** that specify product attributes such as illumination conditions, displays, controls, procedures, work area, and safety measures.

THE PRODUCT



Intended Users

Potential users of this product include:

1. **Practitioners** whose goal is to apply human engineering information to designing and developing human-system interfaces for all types of military and industrial systems. These systems include equipment, facilities, processes, and services incorporating job performance aids, training, comfort, safety, etc.
2. **Researchers** whose goal is to explore and understand basic psychological processes and performance in domains such as vision, cognition, manual activity, and so forth. This includes psychologists and engineers who must understand behavior and the variables controlling it.
3. **Educators** whose goal is to teach students or colleagues about behavioral phenomena. These educators might be university professors, engineering managers and practitioners, or human factors professionals. The educational process might include education in the context of engineering design or behavioral research.

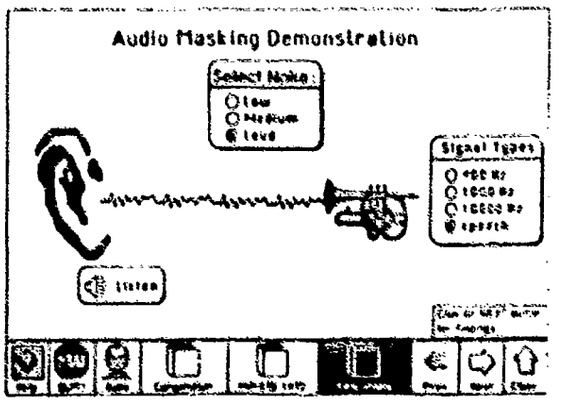
System Function

There are two general functions of this product aimed at supporting the goals of the intended users: 1) a means to experience and explore human behavioral phenomena discussed in the *Engineering Data Compendium*; 2) a means to explore, access, retrieve, and store the human engineering information contained in the documents.

- **Experiencing & Exploring Phenomena**

This product will provide users with the opportunity to gain first hand experience with behavioral phenomena covered in the *Engineering Data Compendium*. Users will be able to select phenomena such as visual tilt effects, short-term memory effects, or the effect of vibration on text legibility, and experience these phenomena as though they were in the laboratory environment. By experiencing these phenomena first-hand, users should be able to generalize them to real world situations.

Users will also be able to explore these behaviors under different conditions by having access to the variables which control the behaviors under study. Finally, users will be able to view the data and interpretations associated with these behavioral phenomena and see how their own data compare to published findings.



• Exploring & Accessing Information

The interface to the CD-ROM will incorporate the latest developments in information retrieval and direct manipulation technology. Users familiar with other Macintosh software will find the P² PROTOTYPER simple to learn and easy to use. They will be able to browse the complete text and graphics of each document on the CD-ROM and explore the existing structures of each document (Table of Contents, Index, Glossary).

Directed search for interesting topics will be supported by several means. Users will be able to enter queries to locate desired words or phrases in complete text of each document. Design and behaviorally oriented taxonomies will allow users to locate related information in both documents through a single access mechanism. In addition, users will have available or be able to create hypertext links in each document to aid searching for information.

Storing and retrieving useful information will be supported by several means. Bookmarks will allow users to know where they are, as well as where they have been. Cutting and pasting operations will allow readers to export useful information to external repositories. Annotation and documentation functions will allow users to create personal notes about entries and search strategies. Users will then be able to save this information for future reference; and, they can print this information or any selection from the documents.

RELATED INFORMATION

References

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System Requirements

Apple Macintosh II
13" Black & White Display
2 Mb Memory
(1) 800 Kb Floppy Drive
40 Mb Hard Drive (Recommended)
CD-ROM Drive (Macintosh Compatible)

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ELECTRONIC TRANSFER OF INFORMATION AND ITS IMPACT ON AEROSPACE AND DEFENCE RESEARCH AND DEVELOPMENT

Technical Information Panel Specialists' Meeting
Brussels, Belgium, 17–19 October, 1989

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14. Abstract

Comprises the papers presented at a Specialists' Meeting held by the Technical Information Panel of AGARD in Brussels, 17th—19th October 1989.

Topics discussed include the present state and trends in the electronic transfer of information in Europe, North America and Japan; operational and experimental systems for electronic storage and delivery of information; operational and experimental systems of electronic publishing and communication; and applications in the aerospace community. Includes papers on proposed telecommunications networks, ISDN and satellite networks, plans for an integrated system for a large technical library, automation plans of the European Patent Office, optical disc systems, desk-top publishing, SGML, electronic mail, computer conferencing and the US Defense Department's CALS programme.

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